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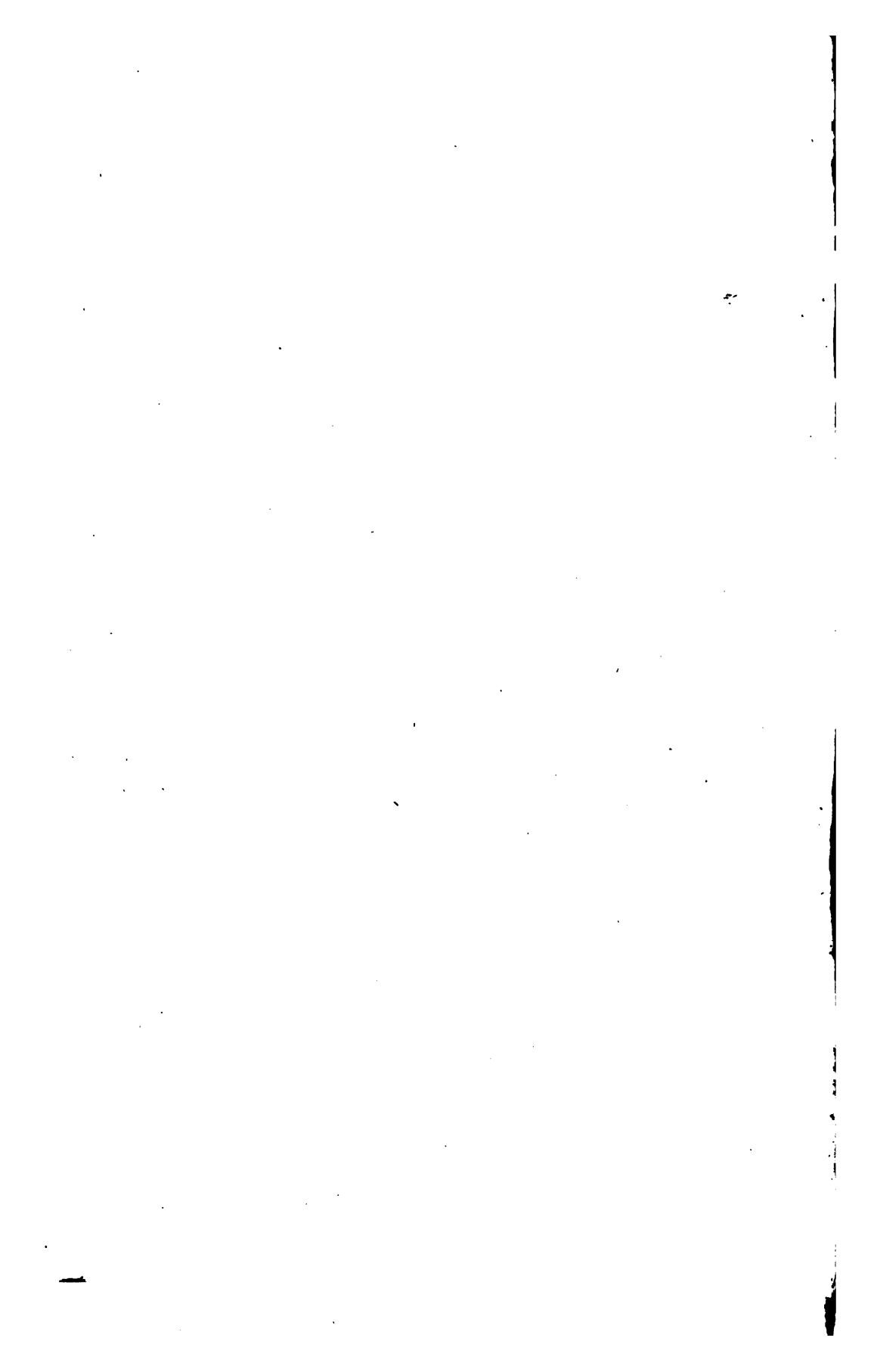
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Wm F. White
Shanghai,
1880.



THE
CHINA SEA DIRECTORY,

VOL. I.

CONTAINING

DIRECTIONS FOR THE APPROACHES TO THE
CHINA SEA AND TO SINGAPORE,
BY THE STRAITS OF SUNDA, BANKA,
GASPAR, CARIMATA, RHIO, VARELLA,
DURIAN, AND SINGAPORE.

COMPILED FROM VARIOUS SOURCES

PARTLY BY J. W. REED, MASTER R.N.

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GLOSSARY OF A FEW MALAY WORDS OF FREQUENT OCCURRENCE IN MAPS, CHARTS, AND SAILING DIRECTIONS.

<i>Malay.</i>	<i>English.</i>	<i>Malay.</i>	<i>English.</i>
Amas	Gold.	Datu, datuk	Chief of a tribe.
Anak, anak ayer ...	Child, rivulet.	Da-un, dahan	Leaf, bough.
Ang-in	Wind.	Dayong	Oar, paddle, to row.
— darat	Land wind.		
— laut	Sea breeze.	Etam	Black.
Api	Fire.	Gading	Ivory.
Arang	Charcoal, coal (?)	Gadong, godong* ...	House.
Ayer	Water, river.	Gajah, gajah mina	Elephant, whale.
— baku	Ice, hail.	Gosong	Shoal, sand-bank.
— dang kal	Shallow water, ford.	Gunong	Mountain.
— masin	Salt water.	— api	Volcano.
— sung-ei	Rain water.	Jambatan, palamban	Bridge.
— tawar	Fresh water.	Jurang, churang ...	Creek.
Banchah	Marsh, morass.		
Barat, barat tepat... West.		Kalang-an	Dry dock.
— daya	South-west.	Kampong†	Enclosure, village.
— laut	North-west.	Kamudi	Rudder, helm.
Batang	River.	Kapal	Ship.
Batu	Rock, stone.	Karang	Coral reef.
— barani	Loadstone.	Karra	Monkey, ape.
— Bedil	Gun, musket.	Karsik	Gravel, sand.
Belantara	Forest, desert.	Kayu, kayu api.....	Wood, firewood.
Bender	Port for trade.	Kilat	Lightning.
Bengkok, bungkok .	Crooked, humped.	Korong	Cabin, poop.
Besar	Large, great.	Kota	Fort, castle, tower.
Besi	Iron.	Kuda	Horse.
Beting	Sand-bank.	Kuku	Fluke of an anchor.
Biduk	Boat, Great bear.	Kuning	Yellow.
Bintang	Star.	Kwala‡	Mouth of river.
— kutab	Pole-star.		
Bras, nasi, imei.....	Rice, boiled rice.	Labuh-an	Anchorage, harbour.
Buah	Fruit.	Lama	Former, old, ancient.
Buaya	Alligator, crocodile.	Lampong	Buoy.
Bukit	Hill.	Lang-it	Sky, heavens, roof.
Bulan, bulan bharu	Moon, new moon.	Lang-kong	Arch, crescent.
— purmana	Full moon.	Lapong	Gap, wide.
Buluh	Bamboo.	Laut, laut besar	Sea, the ocean.
Burong	Bird.	— salatan	Southern ocean.
		Layen	Sail.
Damie	Peace.	Lembah	Valley.
Danau, tasek	Lake, small lake.	Lichah, Lumpun ...	Mud.
Dapur	Cooking place.	Lima, lima-blas	Five, fifteen.

* Godong, corrupted to Godown.

† Kampong, corrupted to Compound.

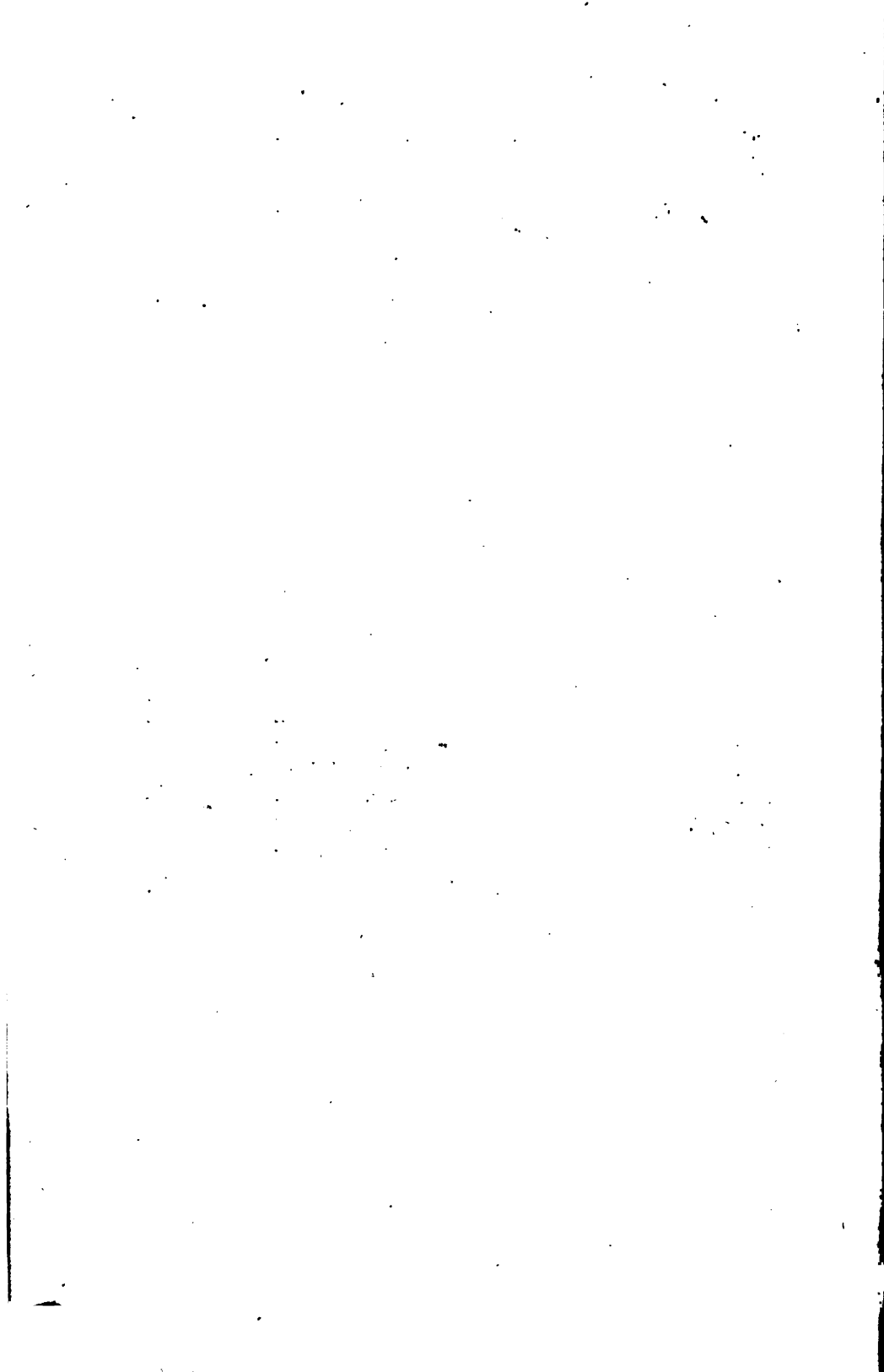
‡ Kwala, written Quallaoe.

<i>Malay.</i>	<i>English.</i>	<i>Malay.</i>	<i>English.</i>
Lubok	Bight or recess.	Rata	Flat, level, low.
Mata	Points of the compass	Rawang, rawah	Swamp, marsh.
Merah	Red.	Rumah chupei	Custom-house.
Nang-ka	Jack fruit (<i>artocarpus integrifolia</i>).	Rumpak	Pirate.
Nagri	City, town, country.	Sakat	Bar, barrier.
Padang	Plain, open space.	Salat, sellat	Strait of the sea.
Padi	Rice in the husk.	Salatan	South,
Padoman	Mariner's compass.	— daya	South-south-west.
Pahak, lembah	Valley.	Sampun	Canoe, small boat.
Pakau, pasar	Market place, bazaar.	Sapah, sippah	Quid of betel.
Palamban	Bridge.	Sudagan (Ar.)	Merchant, trader.
Panjang	Long, tall.	Sung-ei	River.
Panchuran, trusan ..	Channel, passage.	Tambaga	Copper.
Pasang	Tide.	Tambang	Mine.
— besar	Spring tide.	Tanah, benua	Land, country, earth.
— kadang	High water.	Tanda	Beacon.
— kring	Low water.	Tanjong, tapat	Cape, point, cliff.
Paya, rawah	Marsh.	Tasek	Inland sea, lake.
Pendek, korang	Short, wanting.	Teluk	Bay.
Pikul	Weight of 133 lbs.	Timor	East.
Pinang	Betel nut.	— laut	North-east.
Pisang	Plaintain, banana.	— tung-ara	South-east.
Ponchak, kaman-chak.	Peak of a hill.	Ubat bedel	Gunpowder.
Prigi	Well.	Ujong tanah	Promontory.
Pulau, Pulo	Island.	Utara	North.
Putih	White.	Utan, rimba	Forest.
Rachun	Poison,	— timor	North-east.
Rakil ...	Raft.	— sa-mata	North-north-east.
Rantau	Plain, flat sea coast.	timor.	
		— barat-laut...	North-north-west.

The vowels are to be sounded as in Spanish and Italian, or as in the following English words:—*a* and *i* as in ravine, *e* as in there, *o* as in go, *u* as in rule, *ai* and *ei* as in height, *g* hard as in get, *ng* as in singer not as in finger.



From the library of
Prof. Horatio S. Volante



ADVERTISEMENT.

THE China Sea Directory, Vol. 1, contains Sailing Directions for the approaches to the China Sea and to Singapore by the straits of Sunda, Banka, Gaspar, Carimata, Rhio, Varella, and Singapore; and also General observations on the routes ordinarily followed by vessels bound from the Cape of Good Hope to Sunda Strait, and to ports in the China and Java Seas.

Much of the material used in the compilation of this work has been gathered from the surveys of Captain Collinson and Messrs. Richards, Stanton, and Reed, Masters, R.N.; Capt. Ross and Lieut. Robinson, of the Indian Navy; Mr. J. T. Thompson, Government Surveyor at Singapore, and from Dutch surveys; also from the Seaman's Guide round Java, Horsburgh's Directory, Nautical and Marine Magazines, Remark books of H.M. ships, and other documents in the Hydrographic Office.

Sunda Strait to Banka Strait is from various authorities, on which much dependence cannot be placed. Commander Bullock, in H.M.S. *Serpent*, in 1865, and Mr. E. Wilds, Commanding H.M. Surveying Vessel *Swallow*, in 1866, searched in vain for many of the supposed dangers in this route, and rectified the positions of others, yet as no complete survey has been made vessels should navigate it with caution.

Banka Strait is from the surveys made by Mr. W. Stanton, assisted by Mr. J. W. Reed, Masters R.N., during the years 1859—60.

Gaspar Strait was surveyed in 1854 by officers of the United States Navy, and most of the positions, bearings, and distances given in its description are taken from the chart constructed by them.

Carimata Strait has been but partially surveyed. Captains Ross and Maughan, of the Indian Navy, determined the positions of many of the dangers on each side of it, but as much of the information here given has been furnished by passing vessels, the mariner must keep a good look-out, and be prepared to meet with unknown dangers.

Neither has any comprehensive survey been made of Rhio Strait; most of the bearings and distances given in its description have

been taken from a chart published by the Netherlands Government in 1863 from the partial surveys of Dutch Naval Officers; but as the chart is still incomplete, the mariner is cautioned not to place implicit reliance upon the directions for this strait.

As this volume embraces a large extent of coast, and many islands and dangers which are but imperfectly explored, it must necessarily be considered incomplete, and will furnish frequent occasions for revision and amendment. It is, therefore, requested that officers, both of the Royal Navy and Mercantile Marine, will transmit to the Secretary of the Admiralty a notice of any errors or omissions they may discover, or any fresh information they may obtain, with a view to its improvement for the general benefit of navigation.

The China Sea Directory, Vol. 2, will be published, it is anticipated, in the course of the ensuing year. It will contain a description of the China Sea, with its coasts, islands, and dangers between Singapore and Hong Kong, and directions for its navigation in both monsoons. Ultimately the present China Pilot will become the 3rd volume of this work.

G. H. R.

Hydrographic Office, Admiralty, London,
26th December 1866.

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THE
CHINA SEA DIRECTORY,

VOL. I.

**APPROACHES TO THE CHINA SEA AND
TO SINGAPORE, BY THE STRAITS OF SUNDA,
BANKA, GASPAR, CARIMATA,
RHIO, VARELLA, DURIAN, AND SINGAPORE.**

CHAPTER I.

**GENERAL OBSERVATIONS ON THE ROUTES ORDINARILY FOLLOWED
BY VESSELS BOUND FROM THE CAPE OF GOOD HOPE TO
SUNDA STRAIT, AND TO PORTS IN THE CHINA AND JAVA
SEAS.—SUNDA STRAIT.**

At all seasons of the year it is usual for vessels bound from Europe to Batavia, Singapore, Bangkok, Saigon, Sarawak, or Labuan, after rounding the Cape of Good Hope to steer as directed at page 5 for Java head, and to pass through Sunda strait into the Java sea; and, with the exception of those bound to Batavia, to enter the China sea by either Banka, Gaspar, or Carimata straits.

The route by Sunda strait and the China sea is also the direct and ordinary one for vessels bound to China and Manila; but those which pass the island of St. Paul between the middle of September and the middle of January, when the N.E. monsoon is blowing in the China sea—especially those bound to Shanghai or other northern ports either in China or Japan—generally proceed by some of the channels eastward of Java, and enter the Pacific ocean by Macassar strait, the Molucca or Gillolo passages, or by Dampier strait, which are recommended by Horsburgh as the most eligible routes at this season; whilst other vessels during this period enter the Java sea by the strait of Sunda, and then proceed by some of the channels eastward of Borneo.

Now, however, it is not at all an uncommon practice for fast sailing
11056.

vessels bound to China to proceed through Sunda strait and beat up the China sea against the N.E. moonson (page 3); and in weighing the advantages of the two routes, it should be borne in mind that the Eastern passages are but imperfectly known: indeed but little has been added to our knowledge of them since Horsburgh's time, whereas the hydrography of the China sea has been improved by the results of several Admiralty surveys.

Banka strait possesses unquestionable advantages over those of Gaspar and Carimata, and is without doubt the best and safest route into the China sea. It was carefully surveyed in 1859 by Messrs. Stanton and Reed, Masters R.N. in H.M. surveying vessel *Saracen*, and the Dutch have subsequently surveyed it in H.N.M. surveying ship *Pylades*, commanded by Lieut. Keuchanius, so that no part of the Eastern seas, probably, has been so thoroughly explored, and had so much labour expended upon it, as this strait. Although of much greater length, and not so direct for vessels bound to China as Gaspar strait, yet it is manifestly superior to that strait; for it is easy and safe of approach; it affords convenient anchorage in every part, which enables vessels to avail themselves of favourable winds and tides; and it leads into a part of the China sea free from danger. Gaspar strait, on the contrary, is difficult and dangerous of approach, rocks and shoals extending for 35 miles to the southward; the depths of water are too great to afford convenient anchorage; and it conducts into a part of the China sea very imperfectly explored, and abounding with hidden dangers, amongst which vessels are liable to be set by uncertain currents. No serious accident has occurred within the last few years to vessels passing through Banka strait; whereas many fine ships, with valuable cargoes, have been lost in or near Gaspar strait.*

For vessels proceeding to Singapore there can be no doubt that Banka strait is in all respects to be preferred, and it has in fact become the recognized highway of the trade passing between Sunda strait or Batavia, and Singapore. In order to facilitate its safe navigation, the Dutch have recently established a light on Kalian point and erected beacons on the most prominent points and dangers, and they have, moreover, intimated their intention shortly to establish additional lights, so that vessels may pass through at night, with ease and safety. But for ships bound to China, Gaspar strait being shorter and more direct, is still preferred, and will no doubt continue to be by many navigators, especially those who are anxious to make quick pas-

* The Nautical Magazine for 1861 mentions that nine vessels were lost in Gaspar strait that year: and accounts have lately reached us of the total loss of five vessels in that strait during a period of six months.

sages, even at the expense of incurring additional risk. It is certain that a vessel arriving off the entrance of Banka or Gaspar strait in the morning, and favoured with a fair commanding breeze, would gain some advantage in point of time by passing through the latter; but in calms and light airs, or against the N.E. monsoon, there is good reason to believe that vessels will make quick, and often quicker passages, by proceeding through Banka strait, carefully attending to the directions given in Chapter 3; and they will always be assured of much greater safety. In thick or bad weather, it is possible to proceed through Banka strait without risk; but Gaspar strait can never be approached at such times without incurring considerable danger.

Vessels bound to Singapore, and having passed through Banka strait, may proceed either outside the islands of Linga and Bintang, and, making Horsburgh lighthouse, enter Singapore strait from the eastward; or, passing outside Linga and inside Bintang, proceed through Rhio strait into the middle of the strait of Singapore; or they may proceed inside Linga, through the Varella and Durian straits, and, passing the Raffles lighthouse, enter Singapore strait from the westward. The first of these passages is known as the Outer route, the second as the Middle route, and the third as the Inner route.

The Middle route, by Rhio strait, is the one now generally adopted, being safe, sheltered, and easily navigable, the Dutch Government having placed beacons on many of the dangers; whereas the route outside Bintang is exposed in both monsoons, and there are many out-lying rocks and shoals, which render it necessary for vessels to keep at a great distance from the land.

The Inner route, by the straits of Varella and Durian, is adopted when the N.E. monsoon is blowing strong in the China sea, at which time vessels may proceed by it speedily and comfortably, instead of beating about outside against a heavy sea and an adverse current.

The Main route up and down the China sea is that by Pulo Sapatu and the Macclesfield bank. In the S.W. monsoon, therefore, vessels bound to China, and having passed through any of the above straits into the China sea, may proceed as most convenient through the islands lying between Singapore strait and Borneo; and passing on either side of the Anamba islands, shape a course to sight Pulo Sapatu; and from thence to cross the Macclesfield bank, and on to China.

In the strength of the N.E. monsoon it is always extremely difficult, and sometimes impossible, to beat up the Main route of the China sea, and it is never attempted except in fast sailing clipper ships. Late in the monsoon, ships frequently beat up by keeping close to the western edges of the reefs, where the current is never so strong against them, and is often in their favour.

Vessels in this monsoon, however, more frequently proceed by the Palawan passage, which they may enter by passing between the North and South Natuna islands, and between the Royal Charlotte and Louisa shoals, which is the ordinary route, and generally recommended; or they may pass between Tanjong Api, the north-west point of Borneo, and the South Natuna, by the Api passage, and along the coast of Borneo inside the Luconia shoals, to the Palawan. This last is an excellent route for steamers from Singapore, for light winds and smooth water will often be found close to the coast of Borneo, when it is blowing hard with a heavy sea outside in the ordinary route.

CAPE OF GOOD HOPE TO SUNDA STRAIT.

WINDS in the INDIAN OCEAN.—The S.E. trade wind in the Indian ocean will be found between the parallels of 10° and 28° S., from the west coast of Australia to within a few degrees of Madagascar, its northern and southern limits changing two or three degrees to the north or south, according as the sun has north or south declination. When the sun is at its greatest distance north of the equator, the wind veers more to the southward, varying from S.E. to S.S.E.; and when at its greatest distance south of the equator, the wind takes a more easterly direction, varying from E.S.E. to East, or sometimes to E.N.E. To the southward of this trade, as far as 60° or 70° S., the prevailing winds are westerly, which will be found with more or less force and irregularity at all seasons.

The monsoons to the southward of the equator in the Indian ocean blow from S.E. from the middle of April till the middle of September, and from N.W. varying to W.S.W. from October till March. These monsoons extend from near the African coast far into the Pacific ocean, and from the equator to the parallel of 8° or 9° , and near Australia, to 12° or 14° S.

The S.E. monsoon, which is the period of fine season, may be considered an extension of the south-east trade, blowing as far as the equator when the sun is near the northern tropic, and receding to 10° or 11° S. when the sun is near the southern tropic.

The N.W. or westerly monsoon is subject to many irregularities, with occasional heavy gales, thunder, lightning, and rain; it sometimes does not set in before November or December, rarely blowing with regularity and strength except in December and January, when it occupies a zone comprised between lat. 10° or 12° S., and 2° or 3° N.

DIRECTIONS.*—On leaving the Cape steer boldly to the southward,

* See Charts:—Indian Ocean, Sheets I. and II., Nos. 748a and 748b; scales, $d = 0.3$ and 0.5 of an inch.

so as to run down the easting in lat. 39° or 40° S., where the wind blows almost constantly from some western point, and seldom with more strength than will admit of carrying sail; whereas in a higher latitude the weather is frequently boisterous and stormy, with sudden changes of wind.*

In the South-east Monsoon, i.e., from the middle of April to the middle of September, vessels, having passed the island of St. Paul, should not edge away too quickly to the northward, but should endeavour to reach first as far to the eastward into the S.E. trade wind as the meridian of Java head, crossing the southern tropic in about 102° E. In this season a westerly current runs along the south coast of Java, and in the months of June, July, and August, when it is at its greatest strength, it will be indispensable to be well to the eastward, or otherwise the ship will be liable to fall to leeward of Java head. In the vicinity of Java the S.E. monsoon also veers sometimes to East or E.N.E.

In the North-west Monsoon, i.e., from the middle of October to the middle of March, but especially in December and January, the southern tropic should be crossed several degrees to the westward of the meridian of Java head, when a direct course can be steered for Sunda strait, or to make Engano island, or the land about Flat point, the southern extreme of Sumatra. Great care must be taken during this monsoon not to fall to leeward of Java head, for the westerly winds blow with great violence along the south coast of Java, and their strength, united with the strong current setting to the eastward, make it impracticable to beat up along this coast; a vessel may thus have to steer to the southward, and re-enter the S.E. trade, in order to make sufficient westing to fetch Flat point. When nearly on the parallel of Java head, and one or two degrees to the westward of it, a direct course may be steered for the strait, with an allowance for a probable current setting to the southward:

If contrary winds are met with shortly after leaving St. Paul island, in November, December, or January, a vessel may steer at once to the northward, and cross the tropic in 80° or 90° E., when she will meet with westerly winds to carry her to the strait.†

* Some navigators prefer making their easting in a higher latitude than 39° or 40° S., whilst others steer a more direct course for Java head than is here recommended; but the above directions are those usually followed in H.M. ships, and are generally believed to be the best.

† In 1865 H.M.S. *Serpent*, Commander C. Bullock, passed over the reputed position of the Glendinning shoal, said to be in about lat. $9^{\circ} 50'$ S., long. $98^{\circ} 45'$ E. No indication of the existence of such a shoal was found and no bottom was obtained with 140 to 470 fathoms of line, over a space of 30 miles.

Shifting of the Monsoons.—During the periods when these changes occur, i.e., from about the middle of September to the end of October, and from about the middle of March to the end of April, the winds are variable and uncertain. It is advisable at those times to make sufficient easting in the S.E. trade, to bring Java head nearly North, and then to steer direct for it, borrowing a little to the eastward or westward, when it is approached, as may be required by the prevailing wind or other circumstances.

JAVA HEAD, the western extremity of Java, in lat. $6^{\circ} 46' 40''$ S., long. $105^{\circ} 12' 22''$ E., is a bluff promontory at the foot of high land, and is discernible at a considerable distance in clear weather.*

CAPE SANGIAN SIRA.—From Java head the coast runs S. by E. $\frac{1}{4}$ E. about $4\frac{1}{2}$ miles to Palembang point, which is $1\frac{1}{2}$ miles northward of Cape Sangian Sira, the most southern point of this part of Java, in lat. $6^{\circ} 52'$ S., long. $105^{\circ} 14'$ E. From this cape, and $1\frac{1}{2}$ miles to the southward, several rocks project, some of which are above water. The soundings are very deep close to these rocks, and along the shore as far as Java head there is no bottom with 100 fathoms; but as the breakers which line the whole coast seem to indicate that there are rocks under water, it will be advisable to give the shore a berth of at least 2 miles in passing.

From Cape Sangian Sira the soundings decrease in the direction of Klapper island to 40 and 20 fathoms; while farther eastward, between this island and Trowers island, they decrease from 20 to 12 fathoms.

KLAPPER ISLAND, or Breakers island, called by the Malays Pulo Deli, lies 8 miles distant from the nearest shore of Java, and about 18 miles E.S.E. from Cape Sangian Sira. It is very low, covered with large trees, those along the beach being cocoa-nut, and is surrounded by a reef, which in many places stretches off a mile; but on the north-west side there is a good watering place, as boats can enter a little river through a channel with reefs on both sides, and ships may anchor in 12 to 24 fathoms, clay bottom, 2 miles distant from the island, close to those reefs which partially dry at low water. According to Captain F. H. Ampt of the Dutch Royal Navy, this is a good watering place in the S.E. monsoon. The depths are from 30 to 40 fathoms at 4 miles off the south shore of the island.

TROWERS ISLAND, or Pulo Tinjil, is nearly of the same circumference and outward appearance as Klapper island, from which it lies E. by N.

* See Charts:—Sunda Strait, No. 2,056; scale, $m = 0.3$ of an inch; and Java Island, No. 2,058; scale, $m = 0.05$ of an inch.

distant 13 or 14 miles. This island is also surrounded by a reef; and according to the natives, there is a fresh water spring, but Captain Ampt, after a most arduous search, could not discover it.

On the north and west sides of this island there are from 13 to 19 fathoms water, and at the south-east and south sides, at some distance, no bottom at 50 and 100 fathoms. Captain Klein, who lost the *Cheriton* here in 1847, reports that, a mile to the northward of the island there is a rock on which the native proas have sometimes struck. Everywhere else round the island from 13 to 19 fathoms will be found, and at a short distance to the southward more than 100 fathoms.

CAUTION.—Along the coast to the northward of Klappa and Trowers islands, as far as Cape Sangian Sira, there are rocks which in some places lie $1\frac{1}{2}$ and 2 miles off; and no shelter whatever can be found there from S.W. and S.E. gales. Lieut. B. G. Escher, D.R.N., in 1837, discovered a shoal lying to the eastward of Sodon point, about $1\frac{1}{2}$ miles from the shore. It bears N. $\frac{1}{2}$ E. from the east point of Klapper island, and N.W. by W. $\frac{1}{4}$ W. from the west point of Trowers island.

When making Java head in hazy weather, the appearance of the land to the eastward of Cape Sangian Sira, between it and Sodon point, bears much resemblance to the high land of the west point of Java, with the adjacent hills on Princes island; and the low land in such circumstances not being distinguishable at a distance, the position of it is often mistaken for the entrance to Princes channel.

SUNDA STRAIT.

Variation $0^{\circ} 35'$ East, in 1866.

GENERAL DESCRIPTION.—The strait of Sunda, through which passes the great bulk of the vast trade of China, as also most of the trade of Batavia, Singapore, and other ports in the Java and China seas, separates the large islands of Java and Sumatra. It extends over a very considerable area, for between Cape Sangian Sira—the most southern part of the western extreme of Java,—and Flat point—the southern extremity of Sumatra,—the distance is 68 miles, those points bearing from each other N.W. $\frac{1}{4}$ N., and S.E. $\frac{1}{4}$ S.; and from a line between those points, to one between St. Nicholas point, the northern extreme of Java, to the opposite coast of Sumatra, which define the limits of the strait, in length, the distance is 74 miles: the general direction of the track for shipping being about N.E. and S.W. The narrowest part of the strait is at its north-east end, where the distance between Fourth point in Java, and Hog point in Sumatra, is but 13 miles. This part of the strait is divided into two channels, each about 4 miles

wide, by the island of Thwart-the-way, which, no doubt, received its name from the circumstance of its lying right in the middle or fairway of the narrowest part of the strait.

In the strait are several islands forming different channels, by which it may be entered from the westward; but Princes channel and Great channel, both on the south side of the strait, are those most commonly used.

The Great channel is limited on the north side by the conspicuous island of Krakatoa, between which and the coast of Sumatra are four channels, formed by the islands of Bezce and Sebooko. These channels are all on the north side of the strait, Krakatoa being nearly in the middle of it.*

WINDS.—In the strait of Sunda the wind varies from S.S.E. to E.S.E. during the S.E. monsoon; and from W.N.W. to N.W. in the N.W. monsoon. There are also alternate winds, blowing from South before noon, and from North in the afternoon.

TIDES.†—In the narrow part of Sunda strait the tides are greatly influenced by the winds, and frequently resemble currents more than regular tides.

During the S.E. monsoon, in Anjer road, the ebb often sets to the westward from 1 to 2 miles an hour, continuing to run sometimes about 14 hours, with a slack or flood of 6 hours. Off Thwart-the-way and the Button, in the same season, it often runs 14 hours at a time to the south-west, from 2 to $3\frac{1}{2}$ miles an hour; then changes and sets to the north-westward and northward with much less velocity. At other times the ebb sets for about 6 hours to the south-west, and the flood for about the same time to the north-east with nearly equal velocity, about 3 or $3\frac{1}{2}$ miles an hour when strongest at the springs.

During the westerly monsoon, between Java and Thwart-the-way, the tide has also been found to run 3 or $3\frac{1}{2}$ miles an hour when at its greatest strength, the ebb 6 hours to the south-west, and the flood the same length of time to the north-east; but during strong gales from the westward, the flood frequently runs longest into the strait. In this season the tide or current on the opposite side of the strait slants off from the Sumatra coast, about the Zutphen islands, towards the middle of the strait, or the Java shore; and from December to February, the ebb tide along the Sumatra coast, between North island and Hog point, has been found to run generally to the southward from 4 a.m. until 6 p.m., and the flood weakly to the northward during the night. In February and

* See Charts:—Sunda strait, No. 2,056; scale, $m = 0.3$ of an inch; and Sumatra island, Sheet II., No. 2,761; scale, $m = 0.1$ of an inch.

† Horsburgh.

March, a strong current of 4 to $4\frac{1}{2}$ miles per hour sets sometimes in among the Zutphen islands to the W.S.W., or round them towards Hog point, which requires great caution in ships passing those islands, or between Hog point and the Stroom rocks.

At Krakatoa island it is high water, full and change, at 7 h. 0 m., and springs rise 4 feet; neaps are scarcely perceptible.

SUNDA STRAIT: SOUTH SIDE.

PRINCES ISLAND, or Pulo Panaitan, separated from the west part of Java by Princes channel, is the largest island in Sunda strait. Its greatest length, between the west and north-east points, is 12 miles, and its breadth about 8 miles. It is of an irregular form, projecting to a point on the north-east side, and having a large bay on the south-west side, the horns of which form the west and south points of the island. The middle and eastern parts of the island are hilly, the highest peak, 1,450 feet above the level of the sea, being on the eastern shore; but in some parts, particularly at the west end, the land is level and low fronting the sea: all parts of the island abound in wood.

Water.—According to Horsburgh a ship in want of water may anchor on the eastern side of this island in 35 fathoms, soft ground, about half a mile from the shore, with the peaked hill bearing about N.W. by N. Here is a small sandy bay, and at its eastern part a run of fresh water, where the casks must be filled about 100 yards up, the higher the better, otherwise the water will be brackish.

It is, however, only in the N.W. monsoon that water can be procured here, for in the S.E. monsoon all the springs are dry from want of rain, and there is, moreover, no safe anchorage in this monsoon along the east side of the island, as it is a dead lee shore.

Casuaris bay, on the south-west side of the island, is 4 miles deep, and has at its entrance soundings varying from 30 to 50 fathoms, decreasing inside to a convenient depth for anchoring; but being open to all winds between the west and south points, it is not frequented, and cannot be recommended.

Dangers.—The Carpenters are a large group of rocks about a mile in extent, projecting from the south point of Princes island. Most of the rocks are above water, and the sea is usually breaking over them. There is no bottom with 50 fathoms a short distance from these rocks.

The west point of Princes island is fronted by a reef to the distance of about $1\frac{1}{2}$ miles, several rocks of which are seen above water.

On the north-west and north sides, the island is steep to close to the fringe of reef which edges those shores.

A fringe of reef extends from the north-east point of the island, and along the shore on each side.

A similar fringe extends about a third of a mile off the south-east point of the island; nearly 2 miles W.S.W. of which, close in shore, and near a conspicuous White rock, is a coral reef, upon which the sea is always breaking.

PRINCES CHANNEL, between the Carpenters rocks off the south end of Princes island, and the Friars rocks off the First point of Java, is 3 miles broad at its narrowest part, and possesses the great advantage of affording anchorage to vessels when becalmed, which the Great channel does not. Light baffling winds and calms are very common about the entrances to Sunda strait, occurring even in the strength of the S.E. monsoon, and vessels when not able to anchor are liable to be set back by adverse currents.

The depths in this channel are much greater on the Princes island shore than on the opposite coast. Close to the Carpenters there is no bottom with 50 fathoms; with Peaked hill, on the south-east part of the island, bearing from N. $\frac{1}{2}$ W. to W. by N., there are 10 to 30 fathoms, coarse sand, shells, and coral, little more than a cable's length off shore; with the same hill bearing from N.N.W. to S.W. there are 36 to 44 fathoms about a mile distant from the shore. Towards Mew bay the depths decrease to 20 fathoms and less.

DIRECTIONS.—In the S.E. monsoon, when proceeding either way through Princes channel keep closer to the Java coast than to Princes island.

In the N.W. monsoon it often happens that vessels outward bound get very quickly to the westward by proceeding through Princes channel, while those using the Great channel are detained by heavy squalls and adverse currents. Indeed, instances have occurred in which ships have worked through this passage in a remarkably short time in a westerly gale, by carrying a heavy press of sail, and tacking between the squalls, at times when it was impossible for any ship in the Great channel to beat against the current and heavy sea.

Proceeding through Princes channel in this monsoon, keep near Princes island and the Carpenters, especially when working out against westerly winds, for a current will then sometimes be found setting to the westward.* It is, moreover, very important to keep close to the Carpenters when working out, to avoid being set upon the rocks near Java head and Palembang point by the heavy swell, for, being once outside anchoring ground, and in a calm, a ship would have much trouble to clear the coast of Java. The south-east coast of Princes island must not, however, be approached within a mile.

* Horsburgh.

GREAT CHANNEL lies between the north point of Princes island and the south point of Krakatoa island, which are 23 miles apart; and although too deep for anchorage, it is much frequented, being the widest passage into the strait, and is considered to be, with the exception of the doubtful Hoedek rock, clear of danger. If the strait is entered by this channel, keep Princes island aboard, and when farther in the strait, keep on the Java shore.

Hoedek Rock is said to lie about 5 miles S.W. $\frac{3}{4}$ S. from Krakatoa. Captain Drury, R.N., is reported to have examined a rock S.S.W. of Krakatoa some years ago, and found it to be near the water's edge.* The *Abdul Hassim*, drawing 14 feet, is also said to have struck upon a rock, from which the peak of Krakatoa bore N.E. $\frac{1}{2}$ N., distance from the nearest part of the island 6 miles. There is, however, reason to believe that no rock exists in this locality, for Mr. Richards, commanding H.M. surveying vessel *Saracen*, carefully sounded over it in 1854.

FIRST POINT and the FRIARS ROCKS.—The coast between Java head and First point forms a bight, and is fronted by high rocks stretching out a considerable distance in some places. First point, or Tanjong Along-ajang, the south point of entrance into Princes channel, has a conspicuous rock lying abreast of it, called the Friar, which rises abruptly out of the sea, and is steep-to, so that with a steady wind a ship may pass close to it. Close to the northward of First point there is another rock above water, which together with the former are properly called the Friars.

MEW ISLAND, or Pulo Kanti, lying about $2\frac{1}{2}$ miles eastward from First point, is nearly 2 miles in extent north and south, and one mile east and west. The island is hilly, and abounds with wood. Between it and First point, and close in-shore, is a small islet or rock above water, called the Mew stone. The shore is rocky on the outside of Mew island, but safe to approach; the soundings decrease gradually to 8 or 9 fathoms.

Between Mew island and the main there is a narrow but safe channel, with depths from 10 to 5 fathoms, sandy bottom.† When taking this passage, keep close in towards Mew island, as a shoal, called the Watson bank, lies near the Java shore. Sometimes the sea breaks upon this bank, but between it and Mew island there are depths of 3, 5, and 10 fathoms, clay bottom.

Water.—To the eastward of Mew island, on the Java shore, there is a good watering place in the S.E. monsoon; the water is excellent,

* Java Guide.

† See Plan of Mew Bay, No. 686; scale, $m = 2$ inches.

and is poured by a cataract upon the beach. . . Large boats may approach this spot at high water through a narrow channel in the reef, and fill the casks by a hose; at low water they will require a great length of hose to reach the boats.

A little to the northward of the watering place lies a reef of coral, about a cable's length in extent, and about half a mile from the Java shore. Upon its shoalest part there is one fathom water, and all round from 5 to 6 fathoms. A ship standing in for the watering place, must steer between this reef and the island, or rather nearer towards the island, and anchor in 9 or 10 fathoms.

In the S.E. monsoon there is also a good anchorage a little farther out, with the north point of Mew island about W. $\frac{1}{2}$ S., and the east point S. by W., in 16 to 19 fathoms water, sandy bottom.

Plenty of wood may be got upon Mew island or the main land, but Horsburgh advises shore parties to be on the guard against any hidden assaults from the natives.

TIDES.—At Mew bay it is high water, full and change, at about 6 h.

SECOND POINT, or Taujong Gookoolang, consists of a low foreland somewhat broad in appearance, the western extremity of which lies about N.E. by E., nearly 9 miles distant from First point, and its northern extremity,—which is usually known as Second point,—about 3 miles farther to the north-eastward. It may be approached without danger to the distance of one or even half a mile, and in from 26 to 20 fathoms water, the reefs projecting a little way off shore.

From Mew island towards Second point, reefs project half a cable's length from the shore, having very near them 5 to 6 fathoms water, which increases speedily to 10 and 20 fathoms; but with due care and attention to the lead, a ship may approach the shore in order to anchor. On the coast there is scarcely any population, but sometimes proas may be met with having turtle, fowls, and cocoa-nuts for sale.

WELCOME BAY.—N.E. by E. distant $20\frac{1}{2}$ miles from Second point is Third point, and between is a deep bight, named Welcome bay, which in the S.E. monsoon affords good shelter, but should be avoided in the S.W. monsoon. There is, however, good anchorage in the S.W. monsoon, when the wind is not too northerly, behind Second point in 9 or 10 fathoms water; but this anchorage should be approached with great caution, as the soundings decrease very suddenly near Second point, and a shoal* with 12 feet water on it and 6 fathoms close to, extends half a mile off shore between Second point and Tambing point.

* Captain C. Fellowes, H.M.S. *Cruizer*, 1857.

The west side of the bay takes from Second point a direction about S.S.E. $\frac{1}{2}$ E. for a distance of 1½ miles, but about the middle of it the beach forms a small bight, with 4 fathoms at its entrance, but only one fathom farther in. The whole of this side of the bay is skirted by reefs, some parts of which are a mile distant from the shore.

Lieutenants Rietveld and Boom, D.R.N., surveyed Welcome bay in 1841, and determined the positions of the shoals and islands given below. A large portion of the bay, inside Panter and Rocky ridge reefs, has not been examined, but it is supposed to be dangerous.

Two small islets, named Andellan and Little Andellan, lie contiguous to the south-west shore of the bay, about 8 miles from Second point, and 5 from Rocky ridge. Three sand-banks, each surrounded by a sunken reef, lie from half to three-quarters of a mile off these islands, in a N.N.E., East, and S.E. direction. Between these banks and Andellan are from 4 to 6 fathoms, mud; and between that island and the shore from three-quarters to 1½ fathoms. Near the head of the bay, to the eastward of a small islet named Rongit, is a fourth bank.

The distance across from the southern shore of Welcome bay to the south coast of Java is not more than 3 miles, and the sound of the surf on the south coast may be distinctly heard across the isthmus.

The eastern shore of the bay is 22 miles in length, from the head of the bay to Third point, in a direction about N.N.E., and the general depths off it are 15 to 24 fathoms at some little distance from the coast. Several islets and dangers lie off this shore. Baddoe is a small islet, surrounded by a reef, lying about 5 miles from the head of the bay, and about 1½ miles north-west of a point named Tankyngi Parrie. Between this point and the islet are many coral rocks, for the most part dry at low water, and with depths of 7 to 9 fathoms between them.

A large coral rock above water, usually covered with a heavy surf, and appearing of a bright white colour, lies W. $\frac{1}{2}$ N., about 1½ miles from Baddoe; and near it appear to be several reefs. Between the rock and the island are 6 to 12 fathoms water.

Five or six miles north-eastward of Baddoe is Plaggan point, with some islands off it, the southernmost of which is called Mangir, and the others War, Oemang, and Scemoer. These islands, as well as Plaggan point, are surrounded by reefs, a cable in breadth, but at a mile outside there are 15 fathoms, over mud bottom.

Rocky Ridge is an extensive reef mostly above water, and always covered by breakers, by which it may be distinguished at a great distance. It lies about half way between the western shore of the bay and the Panter reefs; and from it Second point bears N.W. by W. $\frac{3}{4}$ W., the south

point of Baddoe S.E. by E. $\frac{3}{4}$ E., and the east point of Andellan S. $\frac{1}{2}$ E. That part of it which remains dry at low water is about 100 yards in length, and the breadth of the surrounding reef the same. The soundings round it are 10 and 12 fathoms increasing at some distance to 18 and 19 fathoms.

Panzer reefs are the outermost of the known dangers which encumber Welcome bay, and they lie nearly midway between Second point and Plaggan point. From their north extremity, in 11 fathoms, Second point bears W. $\frac{3}{4}$ N., Third point N.E. $\frac{1}{2}$ N. 16 miles, the east point of Andellan island S. by W. $\frac{1}{4}$ W., and the south-west point of Baddoe island S.E. $\frac{1}{2}$ S. They consist of four different patches, lying in a N.N.E. and S.S.W. direction from each other, the whole being from half to three quarters of a mile in extent. The shoalest patch has $1\frac{1}{2}$ fathoms water, rocky bottom, but between and close round them are 9 and 10 fathoms, mud.

East and west of these reefs are 17 and 18 fathoms, and to the northward 20 and 25 fathoms.

CAUTION.—Welcome bay appears to be full of dangers not surveyed, and should be entered with extreme caution.*

THIRD POINT, or Tanjong Lussong, like Second point is very low, although sharper, and fronted by rocks to the distance of 2 cables, from which the depths increase to 10 and 18 fathoms. The peak of Krakatoa island bears N.W. by N. from it, and is distant about 21 miles.

PEPPER BAY.—N.E. by E. $\frac{1}{2}$ E. 11 miles from Third point is Papolle island, and between is Pepper bay, which is formed by the coast trending away from Third point to the southward for a distance of nearly 5 miles. Its shores are fronted by reefs which near the points project about half a mile, increasing their distance from the shore towards the depth of the bay, where they extend $1\frac{1}{2}$ miles. The bay is also encumbered with two dangerous reefs known as the Coral bank and Paniang reef. The soundings in the bay generally decrease uniformly from 14 to 10, 5, and 4 fathoms; the latter depth will be found 2 miles off shore. In the eastern monsoon there is safe anchorage N.E. of Lawvengan isle, in 6 or 8 fathoms, soft bottom.

Coral Bank.—Nearly 2 miles east from Third point is a coral bank, the greater part of which is above water, and readily distinguished by its bright white colour. The direction of this bank is S.E. by E. and N.W. by W., about 3 cables in length, and from it Third point bears W. $\frac{1}{4}$ S., the north-east point of Lawvengan S.E. $\frac{1}{2}$ E., and the west point of Papolle N.E. by E. Between this bank and Third point there

* Captain C. Fellowes, H.M.S. *Cruizer*, 1857.

is a channel of 4 to 9 fathoms water, and the depths increase quickly from 7 to 15 fathoms at the distance of a mile.

Lawvengan Islet, lying in the depth of Pepper bay, E. by S. $\frac{3}{4}$ S. distant $3\frac{1}{2}$ miles from Third point, is about three-quarters of a mile long, in a N.W. $\frac{1}{2}$ W. and S.E. $\frac{1}{2}$ E. direction, a quarter of a mile broad, and is surrounded by a reef which projects farthest at the north side, where it reaches the distance of $1\frac{1}{2}$ cables' lengths.

Three-quarters of a mile to the north-westward and to the westward of Lawvengan islet are two reefs, partly dry at low water, and usually breaking.

To the southward, and mid-channel between Lawvengan isle and the shore, is a reef with only 3 feet water upon it, between which and the island there is a narrow channel with 3 and 4 fathoms; but between it and the shore are several small coral reefs that dry at low water.

Paniang Reef is a ledge of rocks, the north-west point of which bears W. by S. $\frac{3}{4}$ S. $1\frac{1}{2}$ miles from the north-west point of Papolle island. It is a mile long, in a N.N.W. and opposite direction, and half a mile in breadth, and the shoalest water upon it is 3 feet, and on some parts from 1 to 3 fathoms are found. This ledge is very dangerous as the sea does not often break upon it, and it cannot be approached by the lead, the depths very near it being 6 and 7 fathoms; but by keeping a good look-out it may be distinguished by the light colour of the water, and its brown patches.

Between Paniang reef and Papolle island, the soundings are 7 to 4 fathoms, mud bottom; and on the east and south-east sides of the reef, 5 to 3 fathoms, towards the shore.

PAPOLLE ISLAND, small, round, and about half a mile in diameter, lies within a mile of the shore, with which it is connected by a reef; there is, however, a channel of $1\frac{1}{2}$ fathoms through this reef, fit for the navigation of proas.

TYRINGIN REEF, lying 2 miles north of Papolle islet, and two-thirds of a mile off the shore near Tyingin, is of coral, partly above water, and generally breaks. It is half a mile in extent N.N.E. and S.S.W., and very steep, having close outside of it 6 fathoms water, increasing to 9, 12, and 15 fathoms at 2 miles distance from the shore.

Between this reef and a small rock near the shore, there is a channel of 3 fathoms, often used by large proas.

Anchorage.—Supplies may be obtained at Tyingin, and a convenient anchorage will be found to the northward of Tyingin reef, at $1\frac{1}{2}$ miles off shore, with Papolle bearing S. by E., and the flagstaff at Tyingin E. by S. or E.S.E., in 7 fathoms, clay bottom.

THE COAST from Tyringin, runs N. by E. and N.N.E., and may be approached, with due attention to the lead, to 2 miles distance, in 18 fathoms, without danger of striking upon the Catharine reef. The general appearance of the coast is low, though occasionally interrupted by hills and conspicuous rocky points.

CATHARINE BANK, lying about 4 miles* to the southward of Fourth point, and half a mile off shore, is a quarter of a cable in extent, N. by E. and S. by W., with some rocky points even with the water's edge, and in other places only half a fathom water; with a little breeze the sea breaks upon it. From its outer edge Fourth point bears N.N.E. $\frac{1}{2}$ E., Krakatoa peak West a little southerly,† and the west point of Thwart-the-way N. $\frac{1}{2}$ W.

Outside this reef are 4 fathoms water, increasing to 10, 14, and 18 fathoms, the latter depth being within a mile of it; the channel between it and the shore has $3\frac{1}{2}$ and 4 fathoms, and is used by proas.

DIRECTIONS.—With a steady and commanding breeze a ship may steer N.N.E. from Third point for Thwart-the-way, which is distant 30 miles; or a N.N.E. $\frac{1}{2}$ E. course for 26 miles, which will place her 2 or 3 miles off Fourth point, when she may either proceed on her voyage or haul in for Anjer road. Very often, however, the winds become light and variable there, and she may be compelled to anchor, in which case these courses would lead too far from the land. For these reasons it is better to keep on the Java shore, avoiding, however, the dangers in Pepper bay, which should not be approached under a depth of 14 fathoms.

When the current is running to the westward in the middle of Sunda strait, an eddy will be experienced near the land, besides which, a vessel may be anchored anywhere along the shore, except near Fourth point, where the bottom begins to get foul and rocky. When beating up therefore, with a contrary wind, it is advisable not to keep too far out in the offing, in order to make the eddy available, and not to lose favourable anchoring ground, and perhaps be compelled to anchor in deep water.

SUPPLIES.—Along the coast to the northward of Tyringin there are numerous villages (campongs), the inhabitants of which frequently come on board ship with fruit, fowls, eggs, &c., and often with turtle.

FOURTH POINT, or Tanjong Tykorang, bearing N.N.E. $\frac{1}{4}$ E., distant nearly 27 miles from Third point, is low, but easily discerned from its numerous cocoa-nut trees. From it the nearest point of Thwart-the-way bears N.N.W. $5\frac{1}{4}$ miles, and Krakatoa peak W. by S. nearly 27 miles.

* Java Guide.

† This bearing, which is also from the Java Guide, would place the reef to the southward of its position on the chart.

LIGHT.—In 1865 a new stone lighthouse was erected on Fourth point. It is coloured white, 35 feet high, and exhibits, at 151 feet above the level of the sea, a *fixed* white light of the second order, visible in clear weather at 20 miles.

CAUTION should be observed in approaching or rounding Fourth point, for a reef projects from it more than half a mile, with soundings of 20 fathoms close to; outside, or to the northward, the depths increase quickly to 25 fathoms, and at 2 or 3 miles off the point to 30 fathoms. The point should not, therefore, be approached any nearer than $1\frac{1}{2}$ miles when rounding it.

ANJER TOWN and ROAD.—At 2 miles E.N.E. from Fourth point, is the flagstaff at Anjer, in lat. $6^{\circ} 3' 10''$ S., long. $105^{\circ} 54' 50''$ E. The town is not easily perceived in coming from the westward, being situated in a bay where the houses are scattered amongst the cocoa-nut trees, and nearly obscured by them, and by a spur of a chain of hills inland. The easternmost of these is a sharp peaked hill called Anjer peak, directly over the town, and is on with it bearing S.S.E.

The anchorage is N. by W. from the fort in from 12 to 19 fathoms water, soft ground. From a position in 16 fathoms, three quarters of a mile off shore, the flagstaff of the fort bears S.S.E., Fourth point S.W. $\frac{1}{4}$ S., the Cap N.N.E. $\frac{1}{2}$ E., and the Button N. $\frac{1}{2}$ E.; and from thence the soundings decrease uniformly to 9 and 8 fathoms at about a cable's length from the reef which fringes the shore. This is but an indifferent roadstead in the N.W. monsoon, and landing is dangerous on account of the high surf. Horsburgh mentions an instance of a ship there being assailed in the month of April by a heavy gale of wind, driven from her anchors, and thrown on the rocky shore.

Supplies, &c.—In the S.E. monsoon ships, both outward and homeward bound, generally call here for water and refreshments, unless they are content to purchase the latter from some of the numerous native boats usually to be met with on the look out for vessels passing through the strait. Buffaloes, poultry, vegetables, and frequently hogs, sheep, and turtle are to be procured here: water may be had by employing the shore boats.

The Dutch have a harbour master, and also a few Javanese troops stationed at Anjer.

LIGHTS.—Two lights, each elevated 35 feet, are exhibited on the piers forming the boat creek at Anjer point; but they are merely common lanterns, and are not easily distinguished from the other lights along the shore, except when landing from a boat.

CAUTION.—Ships should approach the anchorage of Anjer road with great caution, especially at night, paying particular attention to the lead.

They should not attempt to bring up in less than 15 or 13 fathoms, or they will probably get too near the reef fronting the shore, very close to which are 8 and 7 fathoms water.*

† "In weighing from Anjer road with a westerly wind and flood tide, a vessel should cast as quickly as possible with her head off shore, and shoot well into the strait, where she will have room and time to pick her anchor up; it being dangerous to keep a ship drifting in the road while heaving it close up, in consequence of a steep rocky point to leeward, called Lenning. A large ship was recently totally lost upon it, having drifted on while getting her anchor to the bows."

"Ships have frequently found themselves in dangerous proximity to this reef from anchoring in too small a depth of water; and with no room to veer in the event of sudden and violent squalls, which, as in most tropical countries, are very common in this strait."

THWART-THE-WAY, or Pulo Renjang, lying in the middle of the narrowest part of Sunda strait, is 450 feet high, and easily recognized by its irregular shape. It is $2\frac{1}{4}$ miles long, N.N.W. and S.S.E., and very steep all around, except at its southern extremity, where a reef projects 2 or 3 cables' lengths, on which a rock above water is visible.† The highest part of the island bears N. by W. $\frac{1}{4}$ W. $6\frac{1}{2}$ miles from Fourth point, S.W. by W. $\frac{1}{4}$ W. from St. Nicholas point, and N.E. by E. $\frac{1}{4}$ E. from Krakatoa.

The west side of the island forms a small bay, in which there is temporary anchorage in 16 or 17 fathoms pretty close to the reef. A 5-fathoms patch lies about a mile off this part of the island, with irregular depths, 10 to 26 fathoms, around it.

CHANNELS.—The channel between Thwart-the-way and Java is the most convenient for sailing vessels, owing to the depths of water being but from 20 to 30 fathoms, whereas the channel between Thwart-the-way and Sumatra has 40 to 50 fathoms. The latter channel, described at page 38, is moreover encumbered with the Stroom rocks, in dangerous proximity to which ships are liable to be set by rapid currents, and unable, from the great depth of water, to bring up by anchoring.§ The

* Many vessels have anchored in 11 and 9 fathoms, wishing to get as close in as possible, but it is not safe to do so for the reasons stated.

† Capt. J. B. Caldbeck.—Naut. Mag., 1843.

‡ Captain J. B. Caldbeck states that the reef projects a greater distance out than is generally supposed from the southern end of Thwart-the-way; and that at low water the sea breaks more than a mile from the island.—Naut. Mag., 1843.

§ "With regard to the respective merits of these channels, being bound either way through the strait, the preference may be decidedly given to that between Anjer and Thwart-the-way, in consequence of the great rapidity and uncertainty of the tides in the neighbourhood of the Stroom rocks, rendering their proximity very dangerous, and unless

narrowest part of the channel between the rocks off the south point of Thwart-the-way and the reef off Fourth point is a little more than 4 miles; and the distance is the same between the south-east end of Thwart-the-way and the Cap.

THE CAP, or Pulo Oelar, is a small round-shaped island, only about a cable's length in diameter, lying N. by E. 3 miles from Anjer, and about E.S.E. 4 miles from the south-east end of Thwart-the-way.

A shoal is said to lie nearly midway between the Cap and the main land of Java, from which Fourth point bears S.W., and the Cap N.W. by W. $\frac{1}{3}$ W.*

BROUWERS SAND is a dangerous bank lying between the Cap and Merak island, nearly 2 miles off the Java shore. It is composed of very hard sand, and extends nearly 3 miles along the coast in a N.E. $\frac{3}{4}$ N. and opposite direction, its breadth being only 2 cables. There are three shoal patches on the bank, the least water being $1\frac{1}{2}$ fathoms at low tides, and the general depths $3\frac{1}{2}$ or 4 fathoms. Its southern limit is $2\frac{1}{4}$ miles N.E. from the Cap; and its northern end forms with Merak island a channel 2 cables wide, with depths of 18 to 10 fathoms water.

Between this bank and the shore there is a channel a mile wide, with 6 to 10 fathoms water, which increases in the direction of the Cap to 15 and 20 fathoms. But in this channel a rock called Kroenjo, which partly dries at low water, lies $1\frac{1}{2}$ or 2 cables off shore, with the Cap bearing S.W. by W. $\frac{1}{3}$ W., the Button N.W. $\frac{1}{3}$ N., and the west point of Merak island N. $\frac{3}{4}$ W.

The soundings close to the west side of Brouwers sand are from 10 to 15 fathoms, so that vessels should be cautious in approaching it; the depths increase to 19 and 20 fathoms at the distance of a mile, which is a proper distance to pass this danger. To avoid it, when standing in shore the Cap should be kept inside of Fourth point, for the Cap in line with Fourth point leads just outside the edge of the bank.

GREAT MERAK ISLAND, or Pulo Merak Besar, lying N.E. $\frac{3}{4}$ N. $5\frac{1}{4}$ miles from the Cap, is of considerable height, nearly round, and about half a mile in diameter. The island is bordered by a reef, which on the north-west side projects nearly a third of a mile.

in a strong breeze a ship is almost unmanageable. The depth of water on the Stroom side is almost double that on the Anjer shore, except in a south-west line from the Button to Thwart-the-way. Instances have lately been known of ships which, being drifted dangerously close to the Stroom rocks, let go their anchors and run their cables out to the clinch; they were of course still whirled on until by a lucky chance they barely went past the rocks and no more."—Capt. J. B. Caldbeck. Naut. Mag., 1843. Shortly after this account was written, a fine ship, the *Copeland*, of Liverpool, was lost by striking upon the Stroom rocks.

* Mer. Mag., Vol. XVII., p. 123.

LITTLE MERAK, or Pulo Merak Ketchil, lies near the shore, abreast the north end of Brouwers sand, about half a mile to the south-eastward of Great Merak. It is connected to the main by a reef of rocks, which is just under water, and consequently cannot be passed by laden boats.

MERAK HARBOUR is between Great and Little Merak islands and the main coast of Java. It is nearly half a mile in extent, but in mid-channel between the islands there is a rocky bank called Tarremboe, which partly dries at low water. The harbour may be entered by the channel on either side of this bank, as they carry from 5 to 10 fathoms water. The channel into the harbour north of Great Merak is the best, as it is more than a cable in breadth, and carries 6 to 14 fathoms. Entering by the southern channels keep nearer to the Merak islands than to the Tarremboe bank; entering by the northern channel keep Great island shore aboard.*

The anchorage with S.W. winds is East from the highest part of Great Merak, and North of Tarremboe bank, in 6 to 11 fathoms water, soft ground. The Java shore is steep-to. Sometimes a heavy swell sets into the harbour, for which reason it is not to be considered safe for ships in the N.W. monsoon, but small vessels will always find good shelter under Great Merak.

The **COAST** from Merak island takes a north-easterly direction for about $4\frac{1}{2}$ miles to St. Nicholas point. About midway between is a small islet, named Tempoza, lying close in shore. A reef fronts this coast, extending about a third of a mile from it, and passing just outside Tempoza; close to this reef are depths of 10 and 15 fathoms. The shore should not be approached nearer than half a mile, or in less than 20 or 18 fathoms water. The soundings increase regularly from the shore to 30 fathoms; at a distance of 4 miles there are 40 to 50 fathoms.

The **BUTTON** is a high and steep little island covered with trees, and about the size of the Cap, lying well out in the fairway of Sunda strait, 5 miles to the north-eastward of Thwart-the-way. It has 34 and 30 fathoms close to, and bears from St. Nicholas point W. by S., distant nearly 7 miles, and from Hog point E. $\frac{1}{4}$ N. $12\frac{1}{2}$ miles.

ST. NICHOLAS POINT, in lat. $5^{\circ} 52' 33''$ S., long. $106^{\circ} 2' 10''$ E.,† is the extreme end of the high bold promontory forming the northern point of Java. Dangers extend about a third of a mile off the point, and close to them are 11 fathoms, and 32 to 35 fathoms at a distance of from 1 to 2 miles.

* See Plan of Merak harbour, No. 1,388; scale, $m = 0.9$ of an inch.

† By Dutch Trigonometrical Survey of 1841.

DIRECTIONS.—When proceeding to the northward from, or being abreast of Anjer road, steer to pass outside the Cap and inside the Button, at any convenient distance from either, taking care not to borrow too close to Brouwers sand in passing. When clear of that shoal and the Button, steer about N. by E. for the Two Brothers, if bound to Banka strait; or to pass St. Nicholas point at about 2 miles if bound to Bantam, or Batavia.

SUNDA STRAIT: NORTH SIDE.

The SOUTH COAST of SUMATRA, which forms the north shore of Sunda strait, between Flat point on the west and Hog point on the east, a distance of 70 miles, is indented by two large bays, named Keyser and Lampong, the shores of which are fronted by numerous islands and rocks.*

FLAT POINT, in lat. $5^{\circ} 59' S.$, long. $104^{\circ} 32' 37'' E.$, is the southern extremity of Sumatra, and the north-western boundary of Sunda strait. It is properly the western extreme of the low projecting tongue of land which separates Keyser bay from Blimbing bay, and the east point of which is usually, though improperly, called Chinna point, its correct name being Rada, another point 3 miles more to the westward being Chinna point. Rada point bears East a little northerly, and is distant 9 miles from Flat point.

A small reef fringes the shore about Flat point, but at a mile off there are 7 to 10 fathoms.

SAND-BANK.—At $2\frac{1}{2}$ or 3 miles S.W. of Flat point there is a narrow bank, with 8, 13, and 15 fathoms water on it, about 5 miles in length, W.N.W. and E.S.E., and about a mile in breadth, partly consisting of reddish sand.

The soundings outside this bank increase rapidly to 30, 40, and 50 fathoms, and inside of it there is a channel about $1\frac{1}{2}$ miles wide, with 14 and 15 fathoms.

LITTLE FORTUNE ISLAND, or Pulo Batu Ketchil, lies in front of Blimbing bay, just outside Sunda strait, N.W. by W. 9 miles from Flat point, and about 5 miles from the main; it is low, woody, about a mile in diameter, and surrounded by a reef also a mile in extent.

BLIMBING BAY is inside Little Fortune island, and northward of Flat point. At its entrance ships may anchor in 7 or 8 fathoms, and find a good berth with S.E. winds, but not with those from the N.W. Small vessels will be sheltered from all winds by anchoring farther inside in 3 fathoms, behind the projecting reef.

There is also anchorage off the east side of Little Fortune island, in 9 or 10 fathoms. In some charts two reefs are placed in this bay close

* See Chart: Sumatra, West Coast, Sheet 2, No. 2761, scale $m = 0.1$ of an inch.

in shore; it is very probable they do not exist, but it will be advisable to be careful.

Water.—On the east side of this bay is a small river, but its water is brackish; a fresh water spring, however, may be found inside the south-west point, from which a reef projects a quarter or half a mile to the northward.

DIRECTIONS.—Approaching Sunda strait by night, the soundings will be a good guide in passing Little Fortune island and Flat point. At 6 miles off shore the depths are 40 and 30 fathoms, and with a commanding breeze ships may venture into 20 or even 15 fathoms; but when too dark to distinguish the land, it is advisable not to shoal to less than 20 fathoms.

KEYSER or SAMANKA BAY runs inland in a north-westerly direction about 30 miles, and is about 20 miles wide at entrance. Its western shore is steep, affords no shelter from south-easterly winds, and has 20 and 30 fathoms water within half a mile of it.

Tampang bay, just round Rada point, on the western side of Keyser bay, is only an open bight, but has good anchorage ground in depths from 12 to 15 fathoms, a mile off shore. A ship will be exposed here to south-easterly winds, and will have much difficulty, on account of the rocky shore, in getting water from the shallow rivulets that discharge themselves into the bay.

The village of Borne is in the north-west part of Keyser bay, at the mouth of Samanka rivulet, the water of which is good, but boats will find it difficult to enter. The land is low, and fronting the sea marshy. The best anchorage is East or E. by N. from the mouth of the rivulet, 1 or $1\frac{1}{2}$ miles distant from the shore. Ships lie here usually without danger from south-easterly winds, which seldom throw a very high swell so far up the bay. Near Betong point, the southern extremity of the bay near Borne, there is a rocky shoal which projects more than a mile in the offing, with 10 fathoms very near it.

The eastern side of Keyser bay, north of Kalang-bayang harbour, is not so steep as the western side, and affords good anchorage about 2 miles off, in 20 or 30 fathoms; but it is also exposed to south-easterly winds.

KEYSER ISLAND, or Pulo Laboean, lying nearly in the middle of the entrance of Keyser bay, is high and steep to all around, and affords but one spot fit for anchorage, which is on the north-east side in 25 to 30 fathoms, sand, and very near the shore. According to Lieut. P. A. Bloys, D.R.N., that spot is indicated by a bamboo house among the cocoa-nut trees near the beach, but he adds that it is a very indifferent berth in the western monsoon. There is fresh water, but the high surf renders landing very

troublesome. The island is inhabited, well cultivated, and produces large trees fit for masts.

KALANG-BAYANG HARBOUR, on the eastern side of Keyser bay, and about East from the north point of Keyser island, was surveyed in 1845 by Lieuts. Prins and Boelen of the Dutch Royal Navy. It is small, but safe, and affords good shelter from all winds, with sufficient depths of water for large ships. It may be easily recognized by the high and rocky island of Eyoe, which lies about a mile outside, and can be seen 15 miles. Half a mile north-westward of Eyoe there is another island, or rather rock, called Pulo Klappa, with a single cocoa-nut tree upon it. There is a safe channel with 25 fathoms water between these islands.*

Supplies.—According to Horsburgh this harbour is well adapted for a fleet in want of refreshments, as every supply may be obtained; but the Java Guide says that refreshments are very scarce. Water may be obtained from a small rivulet in the north-eastern part of the bay, from whence there is a road leading to the campong, or village, which is situated in a valley, about three-quarters of a mile from the landing place.

DIRECTIONS.—In the N.W. monsoon, enter the harbour by the western passage between Pulo Klappa and the north point called Tanjong Napal, and when the latter bears about West, or W. by S., anchor near the eastern beach in 10 fathoms, soft ground, or anywhere in the harbour, there being no hidden danger.

In the S.E. monsoon steer in about N. by E., between Eyoe and Klappa islands. With a commanding breeze a vessel may pass eastward of Eyoe, between it and Pulo Batu Kabu on a N.N.W. course, or even between the latter island and the main, steering about N.W., but this channel is very narrow. All three of the last-mentioned channels lead close to the Rover rocks, which are, however, easily avoided, and left to the eastward, as most of them are above water.

KILOANG BAY lies 5 miles to the south-eastward of Kalang-bayang, and also affords safe anchorage. It may be known by Tongkalie island, which is visible 12 miles, and lies off the east point of the bay, being separated from the main by a small channel only fit for boats.

Wood.—This bay, as well as Kalang-bayang harbour, contains all sorts of wood.

DIRECTIONS.—Coming from the westward or southward with a leading wind, steer for Tongkalie, till it bears East, distant 2 or 3 cables' lengths, when three groups of Black rocks will be seen, the southernmost of which

* See Plan on Chart of Java island, No. 2,058.

bears N.N.W. from Tongkalie, and S.W. from the others. Steer N.E. and E.N.E. past these rocks in from 30 to 20 fathoms, for the eastern side of the bay, which is very high, till Kiloang island bears West, where a good anchorage may be taken in 13 fathoms between it and the beach, and sheltered from all winds. Kiloang island, which is small and not very high, lies near the eastern beach of this bay, with some rocks at its northern and southern extremities, a large reef to the eastward and a smaller one on its western side. Although the bay is spacious, yet pass close to the westward of Tongkalie. Everywhere else in the bay anchoring ground may be found in 16 to 18 fathoms, but accompanied by a heavy swell. It is unsafe to pass to the northward of Kiloang island, where there are but 3 and 4 fathoms, as a high swell sometimes breaks there. The Black rocks should not be brought to bear to the southward of West, nor is it necessary to run far in. Behind Kiloang island a ship is as safe as in the harbour of Lagoendy.

Vessels may run out with the land wind which blows here from the northward, but it is recommended to have a boat in attendance to tow, lest they should get becalmed under the high land.

MOUNTAINS.—The land of Sumatra, eastward of Kalang-bayang harbour and Kiloang bay, is very high, consisting of the Kalang-bayang or Kamantara mountains, 3,418 feet high; and 3 miles farther to the northward the Ratteh mountains, the southernmost peak of which is 5,097 feet above the sea. More westerly, and not far from the shore of Keyser bay, the Lampong mountains rise to the height of 6,560 feet, and Keyser peak, situated 11 or 12 miles farther to the north-westward, and near the head of the bay, reaches to 7,412 feet.

PEPPER BAY is on the north shore of Lagoendy strait, on the west side of Tikoes point, the south-west point of entrance of Lampong bay. It has a huge three-cornered rock in the middle, and is very limited; but the native proas row up behind the high western beach, where there are 18 fathoms water close in.

LAMPONG BAY, formed between Tikoes point on the west and Rajah Bassa on the east, is very extensive, being about 20 miles wide at entrance, and stretching northward into the land nearly the same distance. At its entrance lie the Lagoendy chain of islands, which extend about 10 miles to the eastward from Tikoes point. Other islands line the western shore of the bay inside, between which and the main there are several good roads or places of shelter. In every part of the bay, from north to south, will be found from 10 fathoms, mud, to 20 fathoms, clay bottom.

Dangers.—If a vessel keep outside the islands on the western shore of the bay there are but two dangers, both of which may be easily avoided.

The first is a sandbank, dry at low water, surrounded by a reef, which rises from 17 fathoms, mud, and bears E.S.E. $1\frac{1}{2}$ miles from Kalagian, and N.E. $\frac{1}{4}$ N. 2 miles from Little Pokowang. The second is a reef with 2 and $1\frac{1}{2}$ fathoms upon it, bearing S.E. $\frac{1}{2}$ S. $1\frac{1}{4}$ miles from the easternmost of the Choondong islands.

PEDADA BAY, the first bight to the northward of Tikoes point, on the western side of Lampong bay, is $1\frac{1}{2}$ miles wide at entrance, and $3\frac{1}{2}$ miles deep.

DIRECTIONS.—When running into this bay in the direction of the southern end of the Kalang-bayang mountains, on a W. $\frac{1}{2}$ N. course, the soundings will be 20 to 15 fathoms, clay and mud, and the three small islands of Pedada, Penarian, and Lalanga will be seen. Pedada is the easternmost and highest, but N. by E. from it half a mile there are two detached reefs, usually covered with breakers; and a third reef N.E., which bears W. by S. from the north point of the bay. Keeping this last reef on the starboard bow, and the other two on the port bow, will lead to an anchorage in 15 fathoms water, very near the village of Pedada, bearing South. This village is to the westward of Lalanga island, and stands on a clear fresh water stream. The high rocky islet of Klappa is connected with Pedada point by three groups of rocks above water, leaving, however, between each of them a passage for small craft. North-eastward of Klappa lie also three patches of rock, with 17 and 16 fathoms, clay, between them; to avoid them keep Lalanga island to the westward of North. This small island is also high, with a reef extending about 2 cables from its north-east point.

POONDO BAY, lying 4 or 5 miles to the northward of Pedada bay, is 2 miles wide and 3 miles deep, with 10 to 7 fathoms water. Across the entrance lies Pokowang, the largest island in Lampong bay except Lagoendy, with a peak on its northern side, and to the eastward a small island, to which it is connected by a reef.

DIRECTIONS.—Poonda bay may be approached on either side of Pokowang. When taking the northern passage, which is preferable, the white coral reefs are seen at some distance, but avoid the reef projecting 3 cables' lengths N.E. from the island, with 15 fathoms close to it. There is also a detached coral reef close to the north-west point of Pokowang, which must be kept on the port side, while the four coral reefs, now visible, and lying mid-channel N.W. and W.N.W. from the centre of Pokowang, should be kept on the starboard side. The depth of 8 or 9 fathoms, mud, will be found a convenient anchorage, Poonda village bearing West, and the south point of the bay S.E. When passing along the south side of Pokowang, or if, when near Pulo Satenga, a W.N.W. course is steered, pay attention to the discolouration of the water on the

2-fathoms banks, which, like all the other visible coral reefs projecting from the south side of the bay, ought to be passed on the north side, keeping in 15 to 9 fathoms, a little less than a mile distant from the south shore of Pokowang.

RATTEH BAY comes next to Poondo bay. It is 3 miles in extent each way, with 16 to 18 fathoms, mud bottom, and at the entrance lies Kalagian island, which is high, and has a small islet separated from its south point by a boat channel of 3 to 8 fathoms water.

Not quite a mile S. by E. from Kalagian lies a coral reef, showing at low water like a black speck, and bearing W. by N. $\frac{3}{4}$ N. $1\frac{1}{2}$ miles from the above-mentioned coral reefs, between which there are 17 and 14 fathoms, mud.

DIRECTIONS.—Ratteh bay may be approached on either side of Kalagian; and the two reefs, which dry at low water, to the westward of the island, may be discerned at some distance, and, consequently, easily avoided. They are not in mid-channel, and lie N.W. and S.E. of each other, with 9 and 4 fathoms between them and Kalagian. Three rivulets on the western side of the bay lead to the villages of Sabo Ratteh and Pinjindangong, and form a bank along the north-west coast, from half a mile to a mile off shore. Menango village, on the north side of the bay, is moderately well inhabited, and from thence to the northward the population of the coast increases.

MAHITAM ISLAND lies off the north point of Ratteh bay, with which it is connected by a reef. There is good anchorage on its north side, in 13 fathoms, mud bottom.

TAGAL ISLAND, flat topped and conspicuous, bears N.E. $1\frac{1}{4}$ miles from Mahitam, and about W. by S., $3\frac{1}{2}$ miles from the Choondong islands. Between Tagal and the western shore there are some sand-banks, which obstruct the passage and leave but a small channel, with 15 fathoms, mud.

In the bay north-westward of Tagal there are the two villages, Ringong and Oerong; and near the south point of the bay is the small island Laho, connected to the shore by a reef, and throwing out another to the northward. The general depth in this bay is 12 to 9 fathoms, mud, and on its northern side is the small island of Tambikel, attached to the main by a reef. North-east from this island, between it and Tankel, there is a channel with 11 and 12 fathoms, mud.

Tagal island, with its flat top, is visible throughout the whole of Lampong bay. When coming in from the eastward, a vessel may steer for it on a N.W. bearing, and pass it in 15 fathoms; and if entering from the southward it is also used as a mark for Lagoendy strait.

TANKEL ISLAND is 3 miles north of Tagal. The north side is low, but the south side high; and from its eastern point a reef stretches off 2 or 3 cables' lengths, showing, at low water, some black spots, which may be passed in from 9 to 14 fathoms.

The **HEAD of LAMPONG BAY**, northward of Tankel, narrows, so as to be scarcely 4 miles wide, but it contains four islands:—Pomogotang, $1\frac{1}{2}$ miles North from Tankel, is all sand, but has some trees, and is surrounded by a large reef. Little Pomogotang, is a bank without trees, 1 mile W.N.W. from the former, and also begirt by a broad reef. Koeber island, lying S.W. from Pomogotang, is separated from the main by a 5-fathoms channel, and a reef runs out 2 cables' lengths from its eastern side. The fourth is the low island of Passarang, in Telok Betong road, S.E. from the river. Besides these islands there are some coral reefs, with depths varying from 1 to 4 fathoms: the easternmost of them bears N. $\frac{1}{4}$ W. from Tagal, and East from the south point of Passarang.

A reef, with 4 to 8 feet water on it, lies 2 cables' lengths from the shore at the head of Lampong bay, with the west point of the easternmost of the Choondong islands bearing S.E. $\frac{1}{2}$ S.; the west point of Pulo Tagal S. $\frac{1}{2}$ W.; the south point of Pulo Passangan W. $\frac{3}{4}$ N.; and Apenberg or Monkey hill, N. $\frac{1}{4}$ E. This reef is about 15 yards broad, and easily recognized by the discoloured water on it; there are 7 fathoms near its south side, 8 fathoms on its east side, and 5 fathoms between it and the shore.

Telok Betong, situated in the north-western part of the bight, is the chief town in Lampong bay. Its population consists of natives of Sumatra and Bougies, with a Regent from the Dutch Government as their Chief. They trade with the Javanese in Lampong tobacco, which is highly esteemed; but this place being never visited by European vessels, fresh provisions are not to be obtained.

DIRECTIONS.—When bound to Telok Betong, after passing to the eastward of Tagal, be careful not to bring its east point to the eastward of South, in order to leave Pomogotang and the adjacent dangers to the westward. When Passarang bears West, or W. by S., and not less than a mile distant on account of its reefs, a good anchorage will be found in 7 to 9 fathoms, mud. The flagstaff, which will, however, be scarcely visible for the high trees, will bear W. by N. or W.N.W.

CHOONDONG ISLANDS.—The eastern side of Lampong bay, between Telok Betong and the Choondong isles, is high, free from danger, and may be approached in safety to 14 and 15 fathoms, close to. From the Choondong islands to Rajah Bassa the coast, at 2 or 3 cables' lengths distance, is fronted by a line of rocks on which the surf breaks heavily with westerly winds, and makes the landing very troublesome.

The Choondong islands are three in number, of which the northernmost is a steep rock, and the two others are larger, but not so high. Between them are narrow passages, with 12 fathoms water; and between them and the main, there are 14 to 10 fathoms, mud. From the easternmost island a coral reef projects S.E., 2 cables' lengths; and at $1\frac{1}{4}$ miles S.E. $\frac{1}{2}$ S. from the same island, lies the coral reef, mentioned in page 25, with $1\frac{1}{2}$ fathoms upon it.

KRANVOGEL ISLAND, 9 miles S.E. from the Choondong islands, and connected to the shore by a coral reef, with 9 fathoms close to its south and west sides, is very difficult to discern, as it lies close to the high land, and consists only of a single rock; just to the eastward of it, however, there are some white limestone rocks on the shore.

BLANTONG BAY.—To the northward of the Tega islets, the Sumatra coast forms a deep curve called Blantong or Lobogh bay, with 4 or 5 fathoms, mud, and a salt-water river. The points of the bay on each side are covered with rocks and a high surf.

TEGA ISLETS.—These three rocky islets lying 3 miles off shore, appear as one when coming from the eastward, and do not begin to open until Rajah Bassa road is approached. The westernmost islet is the largest, and on its north-west side a reef projects 2 cables' lengths, and is indicated usually by breakers; between the two south-easternmost islets there is a channel with 18 fathoms water.

RAJAH BASSA ROAD.—The land forming the south-eastern part of Lampong bay is high, and rises to two conspicuous peaks, 3 or 4 miles inland, named Rajah Bassa mountains. According to Lieut. Melvill, D.R.N., the height of the north-west peak is 4,398 feet, and that of the south-east peak, 4,093 feet. Rajah Bassa road, which lies directly off the high land, was frequently visited by the China ships, it being an excellent place to obtain good water with facility and other refreshments, although Anjer (page 17) is still better.*

According to Lieut. Prins, D.R.N., there are three villages on the shore of Rajah Bassa road. The first is Kalinda, bearing N.N.E. $\frac{3}{4}$ E. from the Tega islets, and having in front of the white sandy beach some large rocks above water, between which there are openings that make it easy to land. The anchorage is in 7 to 10 fathoms, mud, West from the village, and a mile off shore.

The second village is Tyanti, which lies E.N.E. from the largest Tega islet, and abreast that part of the road where is the best anchorage, and the best watering places.

The third village, called Rajah Bassa, is just to the northward of Coconut point, and about East from the Tega islets; it is the largest one

* See Plan of Rajah Bassa Road with views, No. 85, scale $m = 1.0$ inch.

of the three, but the watering there is very difficult, at least much more so than at Tyanti, and the landing dangerous with westerly winds, as the coast there is always covered with high breakers. Boats which go for water ought to remain some distance off, drop their grapnels, and float the casks on shore.

The anchorage in Rajah Bassa road is between the Tega islets and the rocky bank which fronts the shore, but a vessel should not come under 12 fathoms, for the bank in some places projects to the distance of half a mile, having 7 fathoms close to. The best anchorage is a mile off shore, with Cocoa-nut point in one with Hog point, S.E. by E., the north peak of Rajah Bassa E.N.E.; and the northernmost Tega islet, W. $\frac{3}{4}$ S., $1\frac{1}{2}$ miles distant, in 12 to 16 fathoms, blue mud. On these bearings a ship will be just abreast the watering places.

COCOA-NUT POINT, or Klappa, or Rajah Bassa point, is low, covered with cocoa-nut trees, and bears N.W. by W. nearly 8 miles from Hog point, and E. by S. $\frac{1}{4}$ S. from the Tega islets.

BIGHT ISLANDS.—Between Cocoa-nut and Hog points the coast curves in to the north-eastward 2 miles, and at the bottom of this bight are the two small Bight islands surrounded by reefs. On the main land opposite their north sides is a village near a river, and proas and small vessels are sheltered there by a projecting point. The soundings throughout the bight are from 15 to 23 fathoms, decreasing near the shore to 10 and 8 fathoms.

COLLIER ROCK.—About $1\frac{1}{2}$ miles north-westward of Hog point, and about one mile off shore, is the Tims Klip or Collier rock, 6 or 7 feet above water, and 56 feet in circuit. It is fringed by a reef, which on the north-east side projects about 50 feet. Another rock above water lies about a cable's length westward of Hog point, with deep water all around it.

The LAGOENDY GROUP, lying in the south-west part of the entrance to Lampong bay, consists of seven islands, viz., Lagoendy, Round, Saka, Soengal, Tims, Sussarat, and Mangoman; they are uninhabited, but produce good timber, deer, and wild hogs. Along the southern shores of the first four islands, and also along the neighbouring coast of Sumatra, 40 and 50 fathoms, hard ground, are found close in, and the sea there in the western monsoon is very violent, but on their northern side boats can generally land. The following description is by Lieut. Prins, D.R.N.*

LAGOENDY, the largest island of the group, is nearly 5 miles in length, E.N.E. and W.S.W., and close to the southward of its west point are two high, round-shaped rocks covered with verdure, N.E. $\frac{1}{2}$ E. and S.W. $\frac{1}{2}$ W.

* See Plan of Lagoendy Strait on Chart of Java island, No. 2,058.

from each other, with a boat channel between them. On the S.E. side of Lagoendy there is another rock or islet of the same character.

On the north side of Lagoendy there is a small but safe bay, called by Captain Owen, R.N., Nangga harbour, with depths of 15 to 7 fathoms. In the middle of the entrance is the small island Patappan, behind which a ship may find good shelter from wind and sea. Captain Owen careened H.M.S. *Barracouta* here in February 1811, and moored her with the east and west points of the bay bearing respectively N.E. $\frac{1}{2}$ N. and N.W., Patappan from N.N.E. to N. by W., and a cable's length from the reef along the coast. Lieut. Prins says there is room for 10 or 12 ships, and that fresh water is found on Lagoendy, S.E. from Patappan.

MANGOMAN ISLAND, lying a little outside Nangga harbour, has 15 to 22 fathoms, clay, all round it, except on its eastern side, where there are only 10 to 15 fathoms. When coming from the eastward or northward, a mistake may occur between this island and Patappan, but the latter is lower and smaller than Mangoman.

LAGOENDY STRAIT, between Tikoes point and the Lagoendy islands, is 2 miles wide, and may be recommended to ships working out of Lampong bay in the N.W. monsoon. About mid-channel is the high island of Sussarat, with 10 fathoms, sand, close-to, and 30 fathoms farther off. Near its west point there are some rocks, but they are high above water, and Lieut. Prins adds, that although this island is in the middle of the channel, yet in a calm ships need not be alarmed by the current which seems to set towards it; for close-in, the same current will set them off again, and the ripples and green patches of water are of no consequence. The passages on either side of Sussarat are equally good, and with adverse winds or currents good anchorage may be taken to the eastward of that island, in 10 or 12 fathoms.

A CORAL REEF, carrying only 2 fathoms water, and having 13 fathoms around it, lies northward of Mangoman island, and from its north-east side the highest point of Sussarat bears S.W. by W. $\frac{1}{4}$ W.; the west point of Lagoendy S.W. $\frac{1}{4}$ S.; the north point S.E. $\frac{1}{2}$ E.; and the middle of Mangoman S. $\frac{1}{3}$ E. The reef is about 75 yards long, and cannot be distinguished by discoloured water. When on it, the passage between Round island and the east end of Lagoendy is shut in; and when open, a vessel will be to the north-eastward of the reef. The highest point of Lagoendy in one with the west point of Nangga harbour, leads well to the south-westward.

ROUND, SAKA, and SOENGAL ISLANDS.—Round island lies off the east end of Lagoendy, its length being about $2\frac{1}{2}$ miles, N.W. and S.E., and its breadth nearly a mile. Saka lies about one-third of a mile off the

south-west point of Round island ; and Soengal about the same distance off the south-east point.

The depths in the channel, between Lagoendy and Round island, are from 12 to 30 fathoms, hard ground, but a strong current runs there. Saka has also 20 or 30 fathoms close to ; but about half a mile S.E. by S. from it, there is a rock which covers at high water ; it is, however, always visible from its breakers. This passage cannot be recommended, nor that between Round island and Soengal, for although the water is everywhere deep, the ground is foul and the current strong.

TIMS ISLAND, lying 3 miles eastward of Soengal, is very small and low, consists chiefly of red clay, and is surrounded by a broad reef with heavy breakers ; but the channels on either side of it into Lampong bay are quite clear.

KRAKATOA ISLAND, lying in the middle of Sunda strait, is about 5 miles in extent N.N.W. and S.S.E., and 3 miles broad. Its fine conical peak, rising boldly up to the height of 2,623 feet, may be seen at a considerable distance, and serves as a fairway mark for ships entering the strait from the westward. It is in lat. $6^{\circ} 9\frac{1}{2}'$ S., long. $105^{\circ} 27\frac{1}{3}'$ E. A range of high land runs from the peak in a northerly direction for $1\frac{1}{2}$ miles, when it turns to the north-westward, and, gradually diminishing in height, disappears at the north-west point of the island ; the outline of the range is marked by several prominences or peaks. The north coast of the island consists of rocky hills, without any vegetation whatever. The west and south coasts also consist of a steep and rocky shore, and it is only on the eastern coast that there is any level land.

Water.—There is a small spring of fresh water on the north-east side of Krakatoa, opposite the south end of Lang island, but it can only be approached by boats at high water, and ships should not depend upon watering there. A short distance to the southward there is a hot spring, in which the thermometer rose to 154° .

ANCHORAGE in NORTH-WEST MONSOON.—A bank of soft mud extends from the east side of Krakatoa and Lang island about 3 miles, with the peak bearing W.S.W. to S.W. by W., affording excellent shelter from westerly gales, by anchoring in from 20 to 23 fathoms about $1\frac{1}{2}$ or $2\frac{1}{2}$ miles off shore. The peak bearing S.W. by W. is the best berth ; but a ship should not anchor with the north end of the island to the southward of West, or she will be exposed to a heavy sea rolling in from the westward between Krakatoa and Pulo Bezee, during a westerly gale.*

* Horsburgh.

On the 21st February, 1829, the Russian corvette, *Moller*, commanded by Captain Lutke, although only drawing 14 feet, touched on a coral patch, said to lie $1\frac{1}{4}$ miles from the nearest point of Krakatoa, and S.E. from the isle lying off its north-east point; but the description of its position, being rather ambiguous, is not satisfactory.*

VERLATEN, or Forsaken island, 2 miles long, and half a mile broad, lies close off the north-west end of Krakatoa, from which it is separated by a narrow channel with numerous reefs, which make it dangerous for boats to pass through. A white rock 60 feet, and another rock 80 feet high, lie about three-quarters of a mile off its south-west end; and about a mile east of that end of the island, between it and Krakatoa, is a rock or islet, with a rock awash a short distance to the southward of it.

LANG ISLAND, about $1\frac{3}{4}$ miles long north and south, and about half a mile broad, is separated from the north-east side of Krakatoa by a channel barely 2 cables wide at its narrowest part. A reef stretches out from its north-west side nearly half a mile, and encircles its north and east sides at an average distance of half a mile, terminating off its south point. The west side of the island is bold and cliffy, with deep water close to.†

The POLISH HAT is a round islet, lying off the west side of Lang island, between it and Krakatoa; a reef projects about half a cable's length from its north-east side.

The CHANNEL between Krakatoa and Lang island was surveyed in 1854 by Mr. John Richards, Master, R.N., commanding H.M. surveying vessel *Saracen*, who discovered the shoal mentioned by Horsburgh as lying nearly a mile off the south end of Lang island, and which Lieut. Rietveld, D.R.N., could not find. The shore of Krakatoa, forming the west side of the channel, is fringed with a reef extending about a cable's length from it, except at the point nearest Lang island, where it projects only about a quarter of a cable. The soundings in the channel are deep, 30 and 28 fathoms, but they are very irregular, decreasing towards the Polish Hat from the southward.

The above shoal lies a mile S.S.E. from the south point of Lang island, and about a quarter of a mile from the shore of Krakatoa. It extends about $1\frac{1}{2}$ cables in the direction of the channel, and has a rock which is sometimes awash, and others just under water, upon it. The west extreme of Lang island in line with the east extreme of Krakatoa leads between

* Naut. Mag., 1833.

† See Plan on Chart, No. 2056.

this shoal and the reef extending off to the south-east point of Lang island, although it passes very close to both.

BEZEE, or Tamarind island, bearing about N. by E., nearly 12 miles from Krakatoa peak, is nearly 3 miles in extent north and south, and $3\frac{1}{4}$ east and west. This island has also a high peak, named Sebezee, sharper than that of Krakatoa, and resembling a sugar-loaf, which rises abruptly to a height of 2,825 feet from the southern extremity of the island, and slopes gently down to the northward. A reef projects about a third of a mile from the west side of the island, some rocky points of which are visible above water; and off the north-east side there are three small islets called Huisman, Little Tamarind, and Gorts, all of which are surrounded by small reefs having banks between them; the islands and reefs extend a little over half a mile from the shore. Bezee island produces a certain quantity of pepper, and is inhabited by natives belonging to the villages in Lampong bay. The village is on the east side, opposite Little Tamarind island.

Anchorage.—All around this island there is good anchorage in 15 to 25 fathoms water; and at a mile from the north-east side there is an excellent roadstead, even in south-west gales, with 13 fathoms water.

BEZEE CHANNEL, between Krakatoa and Bezee, is 7 miles wide, and frequently used by ships working out in the N.W. monsoon, in preference to the Great channel, because here they have regular soundings from 18 to 30 fathoms, and may anchor when convenient.

Boom rock, lying nearly half a mile off the south point of Bezee island, is a few feet above water.

Hindustan rock is the only known danger in this passage.* According to Horsburgh a ship of that name struck upon it in 1791, and found on its summit, which was only 6 or 8 feet in diameter, 15 feet water, and 10 fathoms close to. Krakatoa peak bore from it S. by W. $\frac{1}{3}$ W.; the west extremity of Verlaten island S.W.; the east extreme of Lang island S. $\frac{1}{4}$ W.; Bezee island from N.E. to N. $\frac{1}{4}$ W.; the peak of Keyser island W. by N.; and the Zeeklip W. $\frac{1}{2}$ N., well open to the southward of Keyser island.

Lieutenants Rietveld and Boom tried to discover this rock, but without success, though they found a shoal with $5\frac{1}{4}$ fathoms, least water, consisting of hard rock and coral, and having all around 6 to 13 fathoms, soft mud and clay, and at some distance 19 fathoms. From this shoal Krakatoa bore S. by W. $\frac{1}{3}$ W.; west extremity of Verlaten island S.W.; south point of Zeeklip West, and the angle between the two extremes of Bezee island was $68^{\circ} 30'$. Some of these bearings agree exactly with the

* See Plan, No. 883; scale, $m=0.8$ of an inch.

former, and it is more than probable that it is the same rock ; but, if not, the true Hindostan rock must be very near to this shoal, possibly a little to the north-eastward or eastward of it.

DIRECTIONS.—To avoid the Hindostan rock or rocks, keep at least 2 miles from the south side of Bezee island. Horskburg gives as the best mark for proceeding through this channel, never to bring Gap rock open to the southward of Keyser island, W. by N. Between Hindostan rock and Boom rock, there are 10, 16, and 20 fathoms water, rocky bottom ; but between this latter rock and Bezee there are 8, 9, 13, 11, and 8 fathoms, with foul bottom. Lieutenant Rietveld saw here different patches of light-coloured water, owing apparently to an eddy current, and although they much resembled sunken rocks, all the casts of the lead indicated 16 to 19 fathoms.

ZEELIP ROCK (Sea rock), bearing W. by S. $\frac{1}{2}$ S. 6 miles from Sebezee peak, consists of three pyramidal rocks very near each other, and showing above water ; the southernmost is the largest, and is often called the Gap rock, on account of a cleft in it. They are visible at a considerable distance, bearing N. $\frac{1}{2}$ E. and S. $\frac{1}{2}$ W. from each other, and are connected under water by reefs, upon which the sea continually breaks. They are steep-to and inaccessible ; and near them are 26 and 30 fathoms, mud and clay.

SEBOOKO ISLAND, N.N.E. a mile distant from Bezee, is not so high as the latter, and consists mostly of craggy hills. It is inhabited by natives of Rajah Bassa, who cultivate some pepper plantations. Its extent is $3\frac{1}{2}$ miles north and south, and about 3 miles east and west.

Close to the east side of Sebooko is Beschutter islet, which is high on the east side, has a reef on its south side, and forms with Sebooko a small bay, with 15 to 19 fathoms water, affording good anchorage for proas. A coral rock, lying mid-channel between the east point of Sebooko and north point of Beschutter, renders it dangerous to enter this little bay from the northward with westerly gales ; but there is a good road for large vessels in 11 and 13 fathoms, 1 or $1\frac{1}{2}$ miles from Sebooko, near the east side of Beschutter.

Reefs project from the numerous points of Sebooko, and in some places they either show above water, or the sea breaks over them, but they do not seem to extend far off, except from the west point, from which a reef stretches off nearly 2 miles ; it is very steep-to, but not dangerous, because the westernmost rock on it rises to a considerable height out of the water, and has a slight resemblance to Zeeklip. This rock lies W.N.W. from the south point of Sebooko ; S.W. by W. $\frac{1}{2}$ W. from its north-west point ; N. $\frac{1}{2}$ E. from the west point of Bezee, and $1\frac{1}{2}$ miles from the west side of Sebooko.

THE CHANNEL between Sebooko and Bezes islands is not quite a mile wide, with soundings from 19 to 23 fathoms, hard sandy bottom; the passage northward of Sebooko, between it and the Tega islets, is $1\frac{1}{2}$ or 2 miles wide, and has 20 to 34 fathoms.

HOG POINT, or Tanjong Toka, bearing S.E. by E. $7\frac{1}{2}$ miles from Cocoa-nut point (page 29), is the south-eastern extreme of Sumatra, and between it and Fourth point on the Java coast, which bears S.E. $\frac{1}{4}$ E. 13 miles, is the narrowest part of Sunda strait. The point has a round hilly appearance, and is easily distinguished when approaching it from the eastward; but, coming from the westward, it has been mistaken for one of the Zutphen islands. The soundings a mile distant from it are from 40 to 60 fathoms.*

THE ZUTPHEN ISLANDS front the coast of Sumatra to the north-eastward of Hog point. Four of them are large, and the remainder are very small, the whole extending N.E. and S.W. about 4 miles, and within $2\frac{1}{2}$ miles of the main. There are several shoals in the passage between them and the coast, amongst which there is said to be anchorage in some places. This passage is generally used by proas, and might be taken by large ships with a commanding breeze, there being sufficient depth of water, but great caution is recommended. The islands are steep-to on their south side, having 40 and 50 fathoms water very near them. The following description is from the surveys of Lieutenant D. H. Kolff, in 1833, and Lieutenant Rietveld, D.R.N., in 1841 :—

KANDANG the south-westernmost island of the Zutphen group, is about a mile long N.E. and S.W., and half a mile broad, of considerable height, and covered with large trees. Off its north-west side are two coral rocks, visible above water, and steep-to on their western sides. Near these rocks on the north-west side of Kandang, there is a small bay that affords a safe anchorage to proas in 11 or 12 fathoms water, close in shore, and even large vessels would find safety there; very often it is frequented by pirates.

HIGH and MOUT ISLANDS, lying to the eastward of Kandang, are of considerable height, rocky and covered with trees. They are about half the size of Kandang, the three islands being separated by narrow channels. Between Kandang and High island is a small islet, with some cocoa-nut trees upon it.

* A rock is marked on the chart at about two-thirds of a mile south of Hog point. It is not noticed in the Java guide; but a view of a rock above water, lying off the point, is given on the Plan of Rajah Bassa road; and a rock above water, with a sunken rock to the southward of it, is marked on the old Dutch Plan of the Zutphen Islands, No. 882; scale, $m = 0.8$ of an inch.

A reef of rocks lies 2 cables' lengths from the north-east, east, and south-east sides of Hout island, with 10 or 12 fathoms in the narrow gut between it and the island. The soundings eastward and south-eastward of Kandang, High and Hout islands are very deep, there being 40 to 50 fathoms a short distance off them.

COCOA-NUT ISLAND, lying westward of Kandang, is small, very low, and surrounded by a reef, which is very steep-to.

THE BROTHERS, two small islands lying to the northward of High and Hout islands, are low and sandy, covered with small wood, and surrounded by a narrow but steep reef, with 15 and 18 fathoms water close to.

With a leading wind, a ship coming from the eastward may pass between the Brothers and Hout island, as this channel has 18 and 20 fathoms water; but its narrowness and the strong currents, sometimes at the rate of 2 and 3 miles an hour, render it dangerous, and the more so as the depths increase speedily to 30 and 40 fathoms. Care should also be taken to avoid the reef projecting from the north-east point of Hout, upon which the *Bombay* grounded in February 1815.

REMOA ISLAND, the northernmost and largest of the Zutphen islands is also the highest, being elevated 300 or 400 feet above the sea. To the north-west there is a low neck of land, which at 2 cables' lengths from the ground begins to rise; the south end is the highest. Part of the low neck is a sandy beach, which affords a good place for boats, it being very difficult to land anywhere else. Remoa is covered with trees, large and small, as also are the other islands belonging to this group.

BOOMPJES REEF.—The south side of Remoa is fronted by a reef, partly above water, with a very narrow channel between it and the island; it is called Boompjes reef, and carries some small brushwood; from its south point the north-east point of Thwart-the-way bears S.E. $\frac{1}{2}$ E.

FATAL ISLET and REEF.—Close to the north-east point of Remoa is a high rocky islet, called Fatal, and from thence a reef projects to the north and north-west, on which is a separate coral rock, dry at low water, and all stretching off about half a mile, with depths of 11 and 12 fathoms close to them, so that the lead gives but little warning. From the northern point of this reef the north point of Fatal island is on with the Button; and from its western edge the west point of Remoa is on with the west point of Kandang island.

TOEMPAL ISLAND, lying westward of Remoa, is small, very low and woody, and surrounded by a reef, which is steep-to.

CORAL ROCKS.—South of Toempal and nearly in mid-channel, are

two steep coral rocks, with 2 or 3 feet water upon them at ordinary tides, and sometimes dry. They lie in the line of the Boompjes reef and the north-east point of Thwart-the-way in one, S.E. $\frac{1}{2}$ E. Close to their east side are 23 fathoms water, which shoals gradually towards Remoa, and westward and southward of these rocks there are 12 and 16 fathoms. A little farther south lies a small but steep coral rock, sometimes dry at low water, from which Boompjes reef is on with the north point of the Button, E. by S., and the southernmost point of Sumatra is on with the east point of Cocoa-nut island.

CAUTION.—On account of the rapid currents experienced at times near the Zutphen islands, in the westerly monsoon, ships ought not to approach their south and south-east parts nearer than $1\frac{1}{2}$ or $1\frac{1}{4}$ miles, particularly in passing Hout island, where the current runs with great velocity, sweeping to the S.W. and W.S.W. round Hog point. In February 1815, the China fleet in passing to the eastward of the Zutphen islands, found a current sweeping them to the westward at the rate of $4\frac{1}{2}$ miles an hour, and several of the ships were carried close to danger. The *Bombay*, after dropping two anchors, was driven on the reef off the north-east part of Hout island; the *Castle Huntly* succeeded in bringing up with two anchors in 14 fathoms, rocky ground, about a cable's length from the *Bombay* aground.

ANCHORAGES.—Lieut. Prins, in 1844, discovered an excellent anchorage for a dozen or more large vessels between Hog point and the Zutphen islands. He says, if in either of the monsoons a vessel cannot beat through, or is detained by calms or currents, she may bring Kandang island to bear N.E., and Sindo island North, and to the westward of that line she may choose her berth in from 30 to 5 fathoms, sand; and from thence the land wind will enable her on the following morning to pursue her voyage. Moreover, just to the westward of Sindo there is a small river, with good water, near Pagatan village.

Abreast the north point of Remoa, the coast of Sumatra forms a bluff, steep point, and just to the northward of this point there is a reef, some rocky points of which are seen above water; while still farther north the coast is fronted with a mud-bank, which makes landing in boats rather difficult. Lieut. Kolff anchored there with the schooner under his command in 7 fathoms, soft bottom, with the above-mentioned steep point of Sumatra S.W., Toempal island, S.S.W., and the north-west flat or point of Remoa, S. $\frac{1}{2}$ E.; he found there some huts near a fresh-water spring, but in general the natives are not to be trusted; and he remarked that some piratical looking proas made a hasty retreat at his appearance.

This officer also anchored, in 12 fathoms, with Toempal island bearing N.N.E.; the north-west point of Remoa, N.E. $\frac{1}{2}$ E.; the steep point of

Sumatra N. $\frac{1}{2}$ W.; the south-west point of Remoa, S. $\frac{1}{2}$ E.; and the little rocky island, close to the shore of Sumatra, where a fresh water spring runs into the sea, about West.

Another anchorage is between Cocoa-nut island and the Brothers, with the west point of High island, bearing South, distant half a mile, in 15 fathoms of water.

DIRECTIONS.—Vessels are strongly advised not to try the intricate and dangerous passage inside the Zutphen islands, especially as there is no reliable chart of it yet published. The following directions are from the Java guide :—

When a ship coming from the northward intends to pass between Sumatra and Remoa, the best way is to haul in shore from that island, and then, in order to clear the reef off its north and north-west points, keep the west point of Kandang just open of the west point of Remoa, till it is between the latter and Toempal; then steer close in for Toempal—which is very steep here—and close to the coral rocks which lie in mid-channel southward of that island. Having passed Remoa, haul in close to Cocoa-nut island, by which a vessel may run freely from the visible reefs, north-westward of Kandang, and find soundings of 16 and 20 fathoms, which will increase southward of Cocoa-nut island to 30, and eastward of Hog point to 50 and 60 fathoms, no bottom.

The **CHANNEL** between Thwart-the-way and the Zutphen islands is but $3\frac{1}{2}$ miles wide, and incumbered with two dangers, viz.; the Stroom rocks off Thwart-the-way, and the Winsor rock off the Button. Owing to the great depth of water in it, 40 to 50 fathoms, it is not so convenient as the channel between Thwart-the-way and Java, where the depths being only 20 to 30 fathoms, much greater facility is afforded for anchoring in calms. Horsburgh says, that the channel between Thwart-the-way and Sumatra is much frequented in the westerly monsoon, by ships bound to the westward, being shorter although more contracted than the other channel between Thwart-the-way and Java. The former may be adopted with a steady wind, for in such case, with the westerly current, a ship will get speedily through; but in light baffling winds, she is liable to be drifted about by strong tides or currents near the Stroom rocks, where there is no anchorage, except in deep water from 40 to 60 fathoms.

STROOM ROCKS, lying N.N.W. $\frac{1}{2}$ W. $1\frac{1}{2}$ miles distant from the west point of Thwart-the-way, are a group of three or four rocks very near each other, with some of their tops visible above the sea at high water, and then only discernible in fine weather at a short distance; at other times they may be seen at a considerable distance by the breakers on the reef which connects them under water. They are steep-to, having 40 and 50 fathoms very near them.

The currents which meet about here from the north and east are very strong, and with the opposite wind, there is, near these rocks, such a boiling and eddying of the water all around, that it almost appears as if they are connected to Thwart-the-way, the light-coloured patches between them appearing like rocks under water.

WINSOR ROCK, on which the American ship *Claudius*, Capt. Winsor, struck in May 1837, was examined by Lieut. B. G. Escher, D.R.N. From it the middle of the Button bears S.E. by E. $\frac{3}{4}$ E., distant $1\frac{1}{2}$ miles; the south-east point of Thwart-the-way, S.S.W. $\frac{1}{2}$ W.; its north-west point, S.W. $\frac{3}{4}$ W.; and the south point of the southernmost Zutphen island is just in one with the northernmost visible point of Bezee island. The least water on it is 16 feet; the depths increasing suddenly in every direction. Other rocks were seen in the eddy on the lee side of the rock.

THE COAST OF SUMATRA from the Zutphen islands runs N.N.E. $\frac{1}{2}$ E. for a distance of 3 miles to a point, not named on the charts, where it trends away to the northward. This part of the coast is fronted by rocks.

PULO LOGOK is a small but very high island, lying one mile north of the above-mentioned point, and 4 miles N. by E. from the Zutphen islands; the coast near it is rocky and steep. Lieut. Kolff found there 15 and 20 fathoms hard sand; but farther to the southward towards the steep point near the Zutphen islands, a mud bank projects from the shore; the lead is there a sure guide, for the bottom in 9 and 10 fathoms is hard, while in 7 and 6 fathoms it becomes soft.

THE SISTERS, or De Gezusters, are three small islands lying about N. by E. 3 to $4\frac{1}{2}$ miles from Logok island. S.E. nearly a mile from them is a small reef with only 2 fathoms water, on which a ship was aground, with North island bearing N. $\frac{1}{4}$ E., and the middle of the Sisters W.N.W. Another in the same predicament had the east point of North island N. by E., and the outermost Sister N. by W. $\frac{1}{4}$ W. to N.W. It is, therefore, advisable to give the Sisters a berth of 2 miles, where irregular soundings of 16, 12, and 8 fathoms will be found.

NORTH ISLAND, in lat. $5^{\circ} 40\frac{1}{2}'$ S., long. $105^{\circ} 50'$ W., is small, bushy, and a full mile distant from the coast of Sumatra. There is a small islet, called Sina, at its southern extremity; and extending to the south-east of it is a shoal of $3\frac{1}{2}$ fathoms water. The island therefore requires a berth of at least $1\frac{1}{2}$ miles; its north and south-west sides are steep-to.

ANCHORAGE.—Between North island and the Sisters the coast bends in a little, and is edged by a mud bank; so that 2 miles from the shore will be found good soft ground for anchoring, in 8 to 12 fathoms, with North island bearing N. by E. Small vessels will find good anchorage between the Sisters and the main, in 2 or 3 fathoms water. Abreast of

the Sisters there is a fresh water spring, but Lieut. Kolff found its contents detrimental to the health of his crew, although it was clear and free from any unpleasant taste.

WORKING OUT of the STRAIT in the NORTH-WEST MONSOON.

—The best way is to pass between the Zutphen islands and the Stroom rock, but recollect the caution in page 37, and give the Zutphen a berth of at least $1\frac{1}{4}$ or $1\frac{1}{2}$ miles on their eastern side, and then beat up by short tacks along the coast of Sumatra between them and Hog point. Afterwards, passing either north or south of the Tega islets (page 28), as the strong currents and hard squalls may allow, try to get westing in Lampong bay, to the northward of Tims island, and to pass between it and Soengal, or through Lagoendy strait. In this manner a ship will make a quick passage through the strait, if the wind be not too variable, besides having the advantage of anchoring behind Sebooko island, or in Lampong bay, if the currents or winds are too strong.*

* There are, however, on record many instances of vessels having beaten out of the strait along the coast of Java, during the western monsoon, with more ease and celerity than could have been effected by stretching into Lampong bay, in consequence of the westerly current having at those times developed its chief strength along the former side of the strait.

The following extract from a ship's log book will show something of the action of this current :—

1846.	At anchor 6 miles W. of Tyingin (page 15).					
March 1.	4 P.M.	Current	S. by E.	2 knots	} Moderate breezes from W.S.W. to W.N.W., but freshening.	
	8 "	"	S.	2 "		
" 2.	4 A.M.	"	S.S.E.	3 "		
	8 "	"	W.	4 "		
At anchor between the Button and St. Nicholas point.						
March 2.	8 P.M.	Current	S,	2 knots	} Fresh breeze from N.W.	
" 3.	4 A.M.	"	S.W.	3 "		
	6 "	"	S.W.	5 "		
	8 "	"	S.W.	3 "		
	12 "	"	S.W.	2 "	N.N.E. moderate.	
	2 P.M.	"	Slack.		} Light westerly breeze.	
	4 "	"	S.E.	2 "		
	8 "	"	S.E.	2 "		
" 4.	1 A.M.	"	S.E.	2 "		Freshening.
	2 "	"	S.	2 "	} Gentle N.W. breezes.	
	4 "	"	S.S.W.	2 "		
	6 "	"	S.W.	4 "		
	8 "	"	S.W.	5 "		

It has been generally supposed that the currents at both ends of Java are regulated by the monsoons ; but according to Lieut. M. H. Jansen, D.R.N., who has had great experience in the Indian Archipelago, it appears that most part of the year a westerly current sets out of Sunda strait. It is much to be wished that this important element in Indian navigation should no longer be left a matter of doubtful opinion.

CHAPTER II.

SUNDA STRAIT TO BANKA STRAIT.

VARIATION $0^{\circ} 50'$ East in 1866.

MONSOONS.—In the Java sea the S.E. monsoon commences in April, gradually increases till May, and ends in October, when the winds become variable. The N.W. monsoon commences early in November, is at its height in December, and continues until the end of March, when it is succeeded by light winds, squalls, and rain. In Carimata, Gaspar, and Banka straits the S.E. and N.W. monsoons prevail as in the Java sea. But the times of the changes of these monsoons and their direction are irregular, and the S.E. monsoon is subject to calms.

The **CURRENTS** in the Java sea are for the most part influenced by the prevailing monsoon, and are generally stronger during the western than in the eastern monsoon. They incline to the northward or southward, according to the influence of the currents of the straits of Sunda, Banka, and Gaspar; for, during the western monsoon they run to the eastward, or more southerly, according to the set of those which come from the straits; and in the eastern monsoon they run to the westward or more northerly from a similar cause. Through a succession of tides which were observed, chiefly during the eastern monsoon, it was found that those which followed the direction of the monsoon were stronger and of longer duration, so that a daily allowance from 8 to 12 miles may be made in the eastern monsoon, and from 20 to 24 miles in the western monsoon.

The **EAST COAST of SUMATRA**, between Sunda and Banka straits,* has never been regularly surveyed. The following description is taken from Horsburgh and the Java guide; and from the Admiralty chart of the Java sea, which has been compiled from Dutch charts corrected to 1861.

The coast is generally low, and covered with wood to the water's edge, and does not therefore present much variation in aspect. It is fronted by some very extensive shoal banks, which in some places project 14 or 15 miles from the shore, but their exact boundaries are uncertain.

From abreast North island (page 39), the coast trends, with a slight

* See Chart:—Java Sea, Western part, No. 2,640, scale, $m = 0.2$ of an inch; corrected to May 1866.

curve inland, nearly North for 13 miles, to a point at which is the entrance of a small river named Nihoung. Two other rivers, the Sakampang and the Niale, also appear on the chart of this part of the coast. From the Nihoung river the coast line runs nearly straight, N. by W. for another 13 miles, where it forms a small bay, and from thence it assumes for a distance of 20 miles a rather irregular outline, in a general direction about N. by E. $\frac{1}{4}$ E. to Tanjong Supong.

Mount Imbong, in lat. $5^{\circ} 20\frac{1}{2}'$ S., generally described as, and sometimes named, Knob hill; is the most prominent hill on the coast near the Brothers, but the latter name tends to mislead. It is of low elevation, of very gradual ascent, and clothed with trees. There is a hill to the north-west of it of Hummock form.*

SHAHBUNDAR BANK and SHOALS.—Abreast of Mount Imbong and of Tanjong Supong, the bank fronting the Sumatra shore projects about a mile only; but between those points it stretches 10 miles in the direction of the Two Brothers; the channel between the bank and those islands being about 6 or 7 miles wide. Upon the outer edge of the bank are several shoal patches, upon one of which the Dutch ship *Shahbundar* narrowly escaped destruction. In 1749 the *Sandwich*, an English ship, grounded in 17 feet, with the northernmost land of Sumatra, that was visible, bearing N. by W., and the northern Brother, E.N.E.-easterly.

As the depths decrease gradually towards this bank, the lead, if attended to, will indicate its proximity. A ship passing between it and the Brothers should not keep farther than 3 or 4 miles from the latter, nor shoal to less than 9 fathoms towards the coast, which in daylight may be kept in sight if the weather be clear.

The COAST.—From Tanjong Supong to a point $1\frac{1}{2}$ miles north-eastward of the river named Kali Saputi, the bearing is North a little easterly, and the distance 13 miles, the coast between forming a bight $3\frac{1}{2}$ miles deep. From thence the coast line runs N $\frac{1}{2}$ W. for 11 miles, and then a little more westerly for 11 miles farther, to the entrance of a large river, the Kali Tulang Bawang. The bank, fronting the coast between Tanjong Supong and the entrance of the Kali Saputi, extends a little more than half a mile from the shore.

The Kali Saputi, the mouth of which is in $4^{\circ} 44'$ S., may be approached as near as 3 or 2 miles. H.N.M. steamer *Vesuvius* anchored, in April 1846, in $3\frac{1}{2}$ fathoms, with the mouth of the river bearing W.N.W., Tanjong Supong S. by W., and the northernmost visible land N. by W.

TULANG BANK.—Northward of the Kali Saputi, the extensive hard sand-bank of Tulang projects as far as 14 miles from the shore; but its

* Commander Bullock, R.N., 1865.

south side, bending in to the northward, forms a kind of bay. The *Vesuvius* searched in vain for a passage inside this bank, and grounded in the attempt. After getting off, she steered S. by E. till the mouth of the Kali Saputi bore W. by S., and then steering East, she had 5 to 7 fathoms upon a hard ground. By edging in to the north-eastward, she at once shoaled to 3 fathoms, but by hauling out South the depth increased rapidly to 9 fathoms, soft ground, having the river about 4 miles W. by N. According to the reports of the natives, there is, however, a kind of passage between the bank and the Kali Tulang Bawang.

KALI TULANG BAWANG.—The mouth of this river, in $4^{\circ} 21' S.$, may be closely approached. Near its entrance there is a small village; and three days' journey up the river, according to the natives, is a town called Mangala, where the Rajah resides. H.N.M. steamer *Vesuvius* anchored in 4 fathoms, 3 miles N.E. by N. from its mouth, and despatched some armed boats up the river in search of pirates, who sometimes hide themselves there. The boats crossed a bar in the mouth, having only one fathom depth of water, but inside of it, and as far up as 14 or 15 miles, they had 3 and 4 fathoms. A mile north of the mouth they observed the mouth of another river, and a third one in lat. $4^{\circ} 6' S.$

The COAST from the Kali Tulang Bawang to Tree island, 37 miles to the North, curves inland 3 or 4 miles, and about the middle of it is the mouth of the river Mesudji. Tree island is in about lat. $3^{\circ} 43' S.$, and close to a point of land to which it is joined at low water. From thence the coast curves round to a point N. by E. distant 17 miles; from which Lucipara point, at the entrance of Banka strait, bears about N.E. by N., distant 15 miles, the coast between forming a bight 3 miles deep.

SHORE BANK.—Between the Tulang and the Mesudji rivers the bank extends from the shore about 3 miles only, but a little northward of the latter it again projects to the distance of 14 or 15 miles; from thence it edges away towards the coast in a N. by W. direction to about 7 miles northward of Tree island, where it approaches the shore within 3 miles; it then runs N.E. for 16 or 17 miles, where its edge is 11 miles distant from the land; here it falls back again towards the coast, and takes a northerly direction to Lucipara point, from which it projects but 2 miles.

Dangerous Patches.—On this bank, between the Mesudji river and Lucipara point, are many dangerous, and occasionally dry, patches. H.N.M. ship-of-the-line *Tromp*, in August 1819, grounded in $3\frac{3}{4}$ fathoms, hard sand, S. $\frac{3}{4}$ W. 9 miles from Lucipara point. At high water she got off, and steered E.N.E. till in 5 fathoms, and then N.E. in 4 and $4\frac{1}{2}$ fathoms till she sighted Lucipara island.

ISLANDS AND DANGERS.

The dangers heretofore supposed to exist between the Thousand islands and the Sumatra shore, known as the Dolphin, Antelope, Banterer, Paulowna,* and Jason,† were searched for in vain by Commander C. Bullock in H.M.S. *Serpent* (1865), and have been expunged from the chart. The position of the Lynn bank, as well as that of the Coventry reef, both of which uncover at low water, were accurately determined. The positions of several other dangers in this route were also rectified, but as no complete survey has been made, vessels navigating this locality are recommended to proceed with caution.

WEST ISLAND, or Pulo Peblaken, in lat. $5^{\circ} 28\frac{1}{2}'$ S., long. $106^{\circ} 23'$ E. is a quarter of a mile in length, and low, but the trees on it may be seen 13 or 14 miles from a vessel's deck. It is steep-to on all sides at half a cable distant, except round its north-east sandy point, off which a coral reef extends a quarter of a mile.

COVENTRY REEF, of coral, dries at low water and was seen always to break in the calmest weather. The shoalest part is S.S.W. one mile from West island, and is about a cable in extent, but it appeared to shelve off to the south-west for a quarter of a mile, which would agree with the account given at the time of its discovery by the *Caroline Coventry* in 1858. Pulo Doea kept open west of West island will clear it to the west-

* A shoal, about three quarters of a cable in extent, was stated to have been clearly seen from the topsail yard of the Dutch barque *Anna Paulowna*, in about lat. $5^{\circ} 39'$ S., long. $106^{\circ} 26'$ E., Pulo Benteng of the Thousand islands bearing E. $\frac{1}{2}$ N., and the west point of Great Tidong island S. by E. $\frac{1}{2}$ E. 9 miles. This position was examined by the *Serpent*, but no shoal was discovered, although evidences of rocky bottom were obtained. She also searched for it without success in another reported position, W. $\frac{1}{2}$ S. 2 or 3 miles from West island, and the conclusion arrived at was that the Coventry reef had been seen by the *Paulowna*.

† A ship named the *Jason* is said to have struck on a rock lying W.N.W. 5 miles from West island, and 18 miles S.W. by S. from the North Watcher; but the boat of the *Warren Hastings* could not find it on these bearings.—Horsburgh.

Three and a half days were spent by the *Serpent* and her boats in searching for this danger. Indications of rock were certainly found, angular pieces of red sandstone or clean sand being brought up on the lead occasionally, when all around showed green mud and coral sand; still this was found in other places. No sign of shoal water was observed from the masthead. Vessels therefore may pass this doubtful danger in fine weather in the day time without apprehension, taking the precaution of a good look out.

It may be here noticed that this rock has never been seen or reported since 1712, a period of 153 years. Nothing can be more vague than its alleged bearing from the North Watcher, or even from West island. On some old charts shoals have been placed on this same-bearing of the North Watcher at 6 and 12 miles from it.

ward ; and Pulo Gosong Rangat in line with any part of North island will clear it to the eastward.

NORTH ISLAND and PULO DOEA, the two north-westernmost of the Thousand islands, stand out very conspicuously from the group. They lie respectively N.E. by E. $\frac{1}{4}$ E. $6\frac{3}{4}$ miles, and N.E. $\frac{1}{2}$ E. 6 miles from West island. In the channel one mile wide between them, Mr. Ross, proprietor of the Keeling islands, reports a detached reef, which was seen breaking from the mast head of the *Serpent*. It lies nearer to North island.

The NORTH WATCHER, the summit of which is in lat. $5^{\circ} 12\frac{1}{2}'$ S., long. $106^{\circ} 27'$ E., is a narrow island half a mile in length, the north-east part covered with high trees, the south-west part with low trees, visible in clear weather 18 or 20 miles. A coral reef,* with only 6 feet water in some places, stretches about half a mile round the south end of the island, with a rock in one place above water. No steps have yet been taken to erect the proposed lighthouse on this island.

Wreck.—The wreck of the *War Eagle* lies S.W. by W. 5 miles from the south-west point of the North Watcher. She is in 12 fathoms, mud bottom, her topmast heads showing above water. A blue flag has been placed on the main topgallant mast-head. She is alleged to have struck on a reef 2 miles to the north-west of the North Watcher, for which a Netherlands vessel has been lately sent to search.

OMEGA ROCK, on which the American ship *Omega* struck in 1835,* lies about E. by S., distant three-quarters of a mile from the North Watcher. According to her captain it is composed of coral, about 150 to 200 yards in extent, N.N.E. and S.S.W., and about 60 or 70 yards broad, is steep-to, and has not more than 9 to 12 feet on the shoalest parts. It should be given a wide berth by a vessel passing eastward of the North Watcher, from which it is separated by a narrow channel with 11 and 12 fathoms water.

EDELING SHOALS.—Between Pulo Doea and West island lie some patches of rocky ground, named the Edeling shoals, to avoid which it is recommended that vessels of heavy draught should not pass eastward of a line joining the two islands, unless south of Pulo Gosong Rangat, the small island surrounded by a sand beach, which lies $2\frac{3}{4}$ miles E.N.E. of West island.

These shoals consist of two coral patches east and west of each other and half a mile apart. On the eastern shoal there may be as little as 3 fathoms at low water ; on the western, $4\frac{1}{2}$ fathoms. They lie directly between Pulo Doea and Rangat ; from the latter they bear N.E. $\frac{3}{4}$ N., and

* Horsburgh.

N.N.E. $\frac{1}{4}$ E. $1\frac{1}{2}$ and $1\frac{1}{2}$ miles respectively. There were found two other patches of 9 fathoms, and so many indications of sandstone bottom, that vessels should approach this vicinity with caution.

BROUWERS SHOAL* has been determined by the Netherlands survey to be in lat. $5^{\circ} 17' 30''$ S., long. $107^{\circ} 0' 20''$ E., about 8 miles north-eastward of its position on the old charts.

PRUISSEN BANK, sometimes placed in lat. $5^{\circ} 17'$ S., long. $107^{\circ} 9'$ E. does not exist, nor does there appear to be any authority whatever to place it in that position.

ARNHEMUIDEN ROCK lies East of the North Watcher. As the position of the latter island has been altered in latitude and longitude, it is probable this may account for the differences in the positions of this well determined shoal, which is in lat. $5^{\circ} 12' 30''$ S., long. $106^{\circ} 42'$ E.

THE TWO BROTHERS are low islands, which together extend one mile in a N. $\frac{1}{4}$ E. direction. The North Brother is small and round, with high trees; the South Brother is 4 cables long, and two of its trees are very high and conspicuous, and may be seen in clear weather 20 to 23 miles off. Broad coral reefs surround the South Brother: round the north island they are narrower. There is a passage between the islands 2 cables wide, carrying 7 to 5 fathoms over an apparently regular bottom. To the east of the islands is good anchorage in 9 to 10 fathoms. The south point of the South Brother is in lat. $5^{\circ} 10' 25''$ S., long. $106^{\circ} 6'$ E.

DOUBTFUL DANGERS.—The dangers said to lie in the track of vessels sailing direct between Sunda strait and the North Watcher were searched for by the *Serpent* during several days. The hand and deep sea leads were kept constantly going, and the sharpness of the mast head man's eyesight stimulated by the offer of a reward for their discovery.

A short time was also devoted to the Antelope and other shoals, reported to lie South and S.S.W. of the Brothers, but nothing was seen of them. A 9-fathoms bank of fine speckled sand was found $2\frac{1}{2}$ to $3\frac{1}{4}$ miles S. $\frac{1}{2}$ E. of the South Brother. This bank which showed of a pale green colour, visible 2 miles, would prove at times a convenient anchorage; the Brothers just touching lead over the shoalest part. There are not more than 10 fathoms between this and the Brothers.

The Dolphin rock, on which the ship *Dolphin* was said to have been aground,† was searched for by the *Serpent* during part of two days. It was described as nearly even with the water's edge, and to lie about 6 miles S.S.E. from the south end of the Two Brothers, but it does not appear ever to have been seen by any other vessel. The distance from the

* The information about the Brouwers, Pruisen, and Arnemuiden shoals was supplied from the Hydrographic Bureau at Batavia.

† Horsburgh.

Brothers is precisely that of the Lynn bank, and a change in the bearing from S.S.E. to E.S.E. (such an error being not an uncommon one), would make it the Lynn. If it were not for some indication of sandstone bottom, no credibility need be attached to the statement which records its existence.

SWALLOW ROCK.—In April 1868 Mr. Wilds, Master Commanding H.M. surveying vessel *Swallow*, succeeded in finding the rock marked on former charts at about 8 miles S.S.W. of the Brothers.* Its position is in lat. $5^{\circ} 17' 40''$ S., long. $106^{\circ} 3' 50''$ E., the South Brother bearing N. 17° E. (true), distant $7\frac{1}{2}$ miles. There are only 22 feet water on the rock, and vessels of heavy draught should be careful to give it a wide berth, as there was neither ripple, break, or swell over it to indicate its position. At half a mile S. by W. $\frac{1}{2}$ W. from the rock soundings in 5 fathoms were obtained on a small patch of sand and shells, with 9 fathoms between it and the rock. The depths around the rock and patch were 9 to 10 fathoms, sand.

LYNN BANK is composed of coral, a cable's length in extent, N.N.E. and S.S.W., and half a cable in breadth, carrying general depths over it of 2 to 4 feet, with some rocks that dry at low water. There are 8 fathoms close to the rock, deepening to 13 and 14 fathoms at a cable's distance. It is in lat. $5^{\circ} 12'$ S., long. $106^{\circ} 12'$ E., and from it the north extreme of the North Brother bears N. 68° W. $6\frac{1}{2}$ miles, and the south extreme of the South Brother, N. 77° W.

These extremes of the islands subtend an angle of 9 degrees ; if therefore they be made, whilst passing on (or within a point or more of) the above bearings, to subtend an angle of 8° , a vessel will pass about a mile outside the bank ; and if an angle of 10° , half a mile inside it. In calm weather the shoal from its dark colour is extremely difficult to see until close upon it ; the above method as a safeguard will then be invaluable and may be used with confidence. A sharp look out should always be kept as the shoal may only be detected by a slight ripple. At night it is recommended to close the Brothers and pass them at 1 to 2 miles.

SHOWERS REEFS are two dangerous coral shoals, separated about half a mile from each other, with a dry patch of sand and coral upon each. They are together a mile in extent, and a quarter of a mile in breadth, with depths of $4\frac{1}{2}$ to 16 fathoms in the swatch between them. Hard ground stretches out from their north and south ends ; at a short distance to the eastward and westward the bottom is soft, and the depths $1\frac{1}{2}$ miles eastward are generally $14\frac{1}{2}$ and 16 fathoms, regular soundings.

The *Serpent* anchored near the north-east part of these reefs. No

* A Dutch ship is reported to have been totally wrecked upon the rock or shoal, marked upon the chart about 8 miles S.S.W. of the Brothers. Mercantile Marine Magazine, May 1855.

astronomical observations were obtained, but the position of the North reef by careful magnetic bearings was made to be in lat. $5^{\circ} 4\frac{3}{4}'$ S., long. $106^{\circ} 15'$ E., the North Brother bearing S. 60° W., distant 10 miles, and the North Watcher S. 58° E., 15 miles. This is rather nearer the Brothers than the commonly received position.

A vessel passing eastward of the Brouwers and Lynn reefs, should keep nearer to the North Watcher than to the Two Brothers. The high mountain seen to the southward is Mount Karang, south of Anger, and in lat. $6^{\circ} 15'$ S., but from the above reef and islands the round hill over St. Nicholas point is more often visible and is a good landmark. The latter is named Mount Agoeng on some charts, but is called by the Dutch Gedeh, and its height is 2,100 feet.

CLIFTON SHOAL.—The ship *Clifton*, of Bristol, is reported to have grounded, in November, 1850, on a shoal with $2\frac{1}{2}$ fathoms on it, lying N. $\frac{1}{2}$ W. $10\frac{1}{2}$ miles from the Brothers.*

A PATCH of hard ground, about 2 miles in extent, having but $4\frac{1}{2}$ fathoms least water over it, appears on the chart in lat. $4^{\circ} 11'$ S., long. $106^{\circ} 8'$ E. The soundings around it are irregular, 6 to 11 fathoms on the east side, and 6 to 9 on the west.

AREND BANK, in lat. $3^{\circ} 46\frac{1}{2}'$ S., long. $106^{\circ} 12\frac{1}{2}'$ E., is 2 miles in length, and the same in breadth, consisting of fine gray sand and broken shells. It has $4\frac{1}{2}$ to 6 fathoms water over it, and is surrounded by a depth of 6 fathoms, which rapidly increases, over a soft bottom.

BOREAS BANK lies E. by N. 9 or 10 miles distant from the Arend bank, in lat. $3^{\circ} 45'$ S., long. $106^{\circ} 24'$ E. It is also composed of fine gray sand; and the least water upon it is 5 fathoms. Around it the depth increases rapidly to 10 and 13 fathoms, except on the north-west side, where the soundings are regular for some time with 5 and 6 fathoms. Between the Arend and Boreas banks there are irregular depths of 8 to 14 fathoms.

CAUTION.—Vessels in this neighbourhood unexpectedly shoaling their water at night ought to be very careful, for many that considered themselves to be upon these banks, were in fact upon those off the coast of Sumatra, near Tree island, and consequently were in great danger. These two banks consist of fine gray sand, while those near Tree island are of coarse sand with gravel.

CITY OF CARLISLE PATCH.—A ship of this name, in 1861, reported a patch of 16 feet to exist in lat. $3^{\circ} 46'$ S., long. $106^{\circ} 20'$ E., or S.W. by W. $\frac{1}{2}$ W. $3\frac{1}{2}$ miles from the Boreas bank. Mr. Wilds, commanding H.M. surveying ship *Swallow*, searched for it the following year but did not succeed in finding it.

* Horsburgh.

SOUNDINGS.—The depths in that part of the sea which lies between the North Watcher, the Two Brothers, and Lucipara, are, except the $4\frac{1}{2}$ and 5 fathoms banks of Arend and Boreas, tolerably regular from 10 to 16 fathoms ; but nearer to Sumatra, about 22 or 24 miles from the coast, they become irregular, changing often, and suddenly, from 10 to 5 and 6 fathoms. Towards Lucipara, in the usual track towards Banka strait, the water shoals gradually to 6 and $4\frac{1}{2}$ fathoms.*

DIRECTIONS from SUNDA STRAIT to BANKA STRAIT.—Having passed through Sunda strait, and bound to Banka strait, it is usual to steer a direct course for the Two Brothers. With a working wind, it will be prudent to keep within a moderate distance of the Sumatra coast ; 11 or 12 fathoms is a good depth. A good mark in daylight is, when standing in-shore, to tack when North island is just on with the highest Zutphen island ; the soundings will then be generally 7 or 8 fathoms, and a large ship should not risk a less depth when working between North island and the Swallow rock (page 47), which she will pass eastward of if the South Brother is not brought eastward of N. by E.

Although the space between the Thousand islands and the Two Brothers can be navigated with more confidence since its partial examination by Commander Bullock in H.M.S. *Serpent* in 1865 (see page 44), yet, as no complete survey has been made, the mariner is recommended to proceed with caution. The Brothers may be passed at a prudent distance on either side. On passing to the eastward, take care to avoid the Lynn and Brouwers reefs (page 47) ; and when passing between the islands and the Shahbundar banks, a vessel should not keep farther from the islands than 3 miles, and not nearer the coast of Sumatra than the depth of 9 fathoms.

Having passed the Brothers, steer to the northward towards Lucipara, keeping the Brothers to the westward of South, to avoid the reported position of the Clifton shoal (page 48), and endeavouring to keep in soundings from 9 to 12 fathoms, as a direct course cannot be depended upon, on account of irregular currents or tides setting out from the rivers. Neither can the soundings in this track be implicitly trusted to, being irregular, from $8\frac{1}{2}$ to 11 or 12 fathoms in some places, particularly contiguous to Tree island bank, and the edges of the other banks projecting from the coast of Sumatra, also in the vicinity of the Arend and Boreas banks in the offing. It will be, however, prudent to borrow towards the main if the depths increase to 12 or 13 fathoms ; and to haul off from it if they decrease to $8\frac{1}{2}$ or 9 fathoms towards the banks that line the coast. Near these, the soundings are generally hard and more irregular than

* A wreck formerly lying about 14 miles to the southward of Lucipara, the mast-heads of which were visible above water in 1845, is said to have disappeared.

farther out from the land, in 12 or 13 fathoms; but in the latter depths a ship will be too far off the coast with a westerly wind.

When the weather is clear, during the day, it may be proper to get a sight of the coast from the poop of a large ship at times, edging out occasionally in the night, or when the depths decrease to $8\frac{1}{2}$ or 9 fathoms. Having passed the bank off Tree island, the coast may be approached with greater safety, and the depths will decrease regularly steering northward for Lucipara, to $5\frac{1}{2}$ fathoms, when it bears N. $\frac{1}{2}$ E. about 10 miles.

If at night a vessel should come into shallow water between the Two Brothers and Lucipara, and not being certain whether she is on either the Arend or the Boreas banks, or that off the coast of Sumatra, it is advisable to anchor immediately, and to wait for daylight, for the depths are moderate, and the bottom throughout this track generally favourable for that purpose.

From BANKA STRAIT to SUNDA STRAIT.—When bound from Banka strait to that of Sunda the proper course would be about S. by E., keeping in from 9 to 13 fathoms; but the currents are too variable to trust implicitly to any course, and the depths also are too irregular to depend upon them alone, for the 5 and $4\frac{1}{2}$ fathoms Boreas and Arend banks may be easily mistaken for those south-eastward of Tree island, which are very dangerous. It will therefore be advisable in day-time to keep on the Sumatra side in 8 or 9 fathoms, from which depths that shore is generally visible from the deck, and at night to keep off shore when the water shoals to less than 9 fathoms, and to approach it when it deepens to more than 13 fathoms, as that depth with westerly winds would be too far off.

Having arrived in about $4^{\circ} 40'$ S., or about 30 miles distant from the Two Brothers, keep as nearly as possible in 9 or 10 fathoms, so as to get sight of these islands bearing South, but not to the eastward of that bearing in order to avoid the Clifton shoal (page 48); otherwise, if made when in 11 fathoms, it would be difficult to weather them with a westerly wind, especially as the current runs to the south-eastward during the western monsoon. When passing to the eastward of the Two Brothers recollect the Brouwers and Lynn reefs.

Coming from the northward the Two Brothers appear like one island, and hence some vessels have been led into danger by mistaking Mount Imbong, or Knob-hill, in Sumatra, when seen in the twilight, for these islands. Sailing past these islands at night, the vessel's position should be well ascertained before dark, or else it would be better to anchor.

Having passed on either side of the Brothers, the safest bearing to bring them upon appears to be N. $\frac{1}{2}$ E. After losing sight of them upon that bearing, a course about S. by W. may be steered for the entrance of Sunda strait. To work between the Brothers and Sunda strait, *see* page 49.

CHAPTER III.

BANKA STRAIT—AND NORTH-WEST AND NORTH COASTS
OF BANKA ISLAND.VARIATION $1^{\circ} 10'$ East in 1866.

GENERAL DESCRIPTION.—The strait of Banka separates the islands of Banka and Sumatra, and trends with many bendings to the north-westward.*

The coast of Sumatra is very low, densely covered with wood, and offers no other variation than a few points, or rather roundings, which are only clearly distinct at short distances, and are easily mistaken for the so-called false points, which are observed immediately after rounding the real points. The shore being inundated at high flood, the distance from it is generally over estimated.

The island of Banka is covered with hills and mountains, varying from 930 to 2,320 feet in height; and it is remarkable that, notwithstanding their comparatively small height, their summits are generally covered with clouds, which accounts for the erroneous height given to these hills by various authors, who have estimated them at upwards of 9,000 feet.

On the Banka coast are prominent points, sandy beaches, and in some places deep bights, as on the Sumatra side; as a rule, wherever sand occurs casuarina trees will be found, the other trees are principally pine, teak, and aspen. Near the western point of Banka stands the capital of the colony (or residency) of that name, called Mintok, and its roadstead is much visited by the coasters that supply the Chinese miners with rice.

The whole coast of Sumatra is bordered by a mud flat, which is narrower off the points, but in some of the bights from 2 to 4 miles wide. Towards the Banka side the bottom becomes gradually harder, and even rocky. Besides the few small islets and rocks in this strait, there are the group of Nangka islands, where vessels sometimes proceed to procure fresh water and wood. Many rivers discharge themselves into the strait, of which the principal are the Soensang and the Assing, both navigable to a great distance for vessels of heavy burden.

*See Charts:—*Gaspar and Banka Straits, with Plans of Lucipara and Stanton Channels, and Nangka Islands, No. 2,149; scale, $m = 0.14$ of an inch. Banka Strait with views, No. 2,597; scale, $m = 0.25$ of an inch. Banka Strait, south entrance, showing the Lucipara and Stanton Channels, No. 2,808; scale, $m = 0.7$ of an inch.

The entrance to Banka strait is encumbered with numerous long and narrow banks of sand, having various depths of water over them, and deep channels between. Only two of these channels, however, are available for the ordinary purposes of navigation, as it is not possible to give any directions which would enable vessels to use the others with safety; but in the event of a vessel from accident or other cause finding herself amongst the banks, she would be enabled by careful attention to the Admiralty Chart to extricate herself without much difficulty.

Until the survey of this strait by Mr. W. Stanton, assisted by Mr. J. W. Reed, Masters R.N., in H.M.S. *Saracen* during the years 1859 and 1860, very little was known of the banks at its entrance. The Dutch had published a chart compiled from the observations of the officers of the Dutch men-of-war employed at various times on the station, which furnished a pretty correct outline of the coasts on both sides the strait, and showed the positions of the prominent dangers in the fairway, but the soundings on it were very imperfect, and the space eastward of Lucipara, occupied by the numerous long narrow sand-banks above referred to, was almost a blank.

The ordinary route of vessels up to the time of the *Saracen's* survey was through the Lucipara channel, between the island of Lucipara and the coast of Sumatra; but the advantages which a navigable channel along the coast of Banka island would offer to vessels passing through Banka strait had been long felt by seamen, and Baron Melvill in the *Java Guide* remarks upon this want as follows:—

“The passage between Lucipara and Banka would have great advantages in entering or leaving the strait of Banka, were it not encumbered so much with shoals and banks, the positions of which are not known correctly, and which render this passage unsafe, at least for large vessels, although Commodore Watson took the *Revenge* by night to the eastward of Lucipara, into the strait of Banka, and had not less than $5\frac{1}{2}$ fathoms water. For vessels of light burden and beating up against the western monsoon, this eastern channel into the strait is very desirable, as it is almost impossible to make any progress against the strong and continual currents in the Lucipara passage.”

During the *Saracen's* survey, an excellent passage, now named Stanton channel, nearly 3 miles wide in its narrowest part, and with depths varying from 7 to 20 fathoms, was found between Lucipara and Banka. Mr. Stanton gives the following reasons for preferring this channel to the old one between Lucipara and Sumatra.

—“The Stanton channel will be found to possess many advantages over that of Lucipara, for it is a mile wider, the approaches to it are marked by well defined hills on Banka island, and a vessel of the largest draught may pass through it at any time of tide; whereas vessels frequently get on

shore in using the latter channel, for the coast of Sumatra, consisting of low muddy mangrove shores about 50 or 60 feet in height, is unmarked by a single conspicuous object to assist the seaman to clear the mud flat bordering its entire length, and which a few miles southward of Lucipara point extends 11 miles from the land. The island of Lucipara also is small, about half a mile in length, and no marks can be given to avoid the rocks extending a considerable distance to the southward and eastward of it.

"The water also in the Stanton channel being much deeper than in the Lucipara causes the banks, which are mostly of sand, to be easily recognized by the light colour of the water on them. The tide also ebbs and flows more regularly in this channel, and sets directly through it, which enables vessels even in calms to drop through; whereas in light winds and calms they are often set over amongst the dangerous banks whilst rounding First point in endeavouring to get through the Lucipara channel.

"The wind in the N.W. monsoon blows off the Banka coast, and throughout the year land breezes generally occur during the night. A strong land wind from the N.E. has been experienced in the Stanton channel during the S.E. monsoon, when the wind was blowing directly through the Lucipara from the S.W.

"There is also but little variation in the depth of water between the Sumatra coast and the Lucipara shoals; and it is stated that during the months of January, February, and March, when the N.W. monsoon is at its full strength, the southern current continues from 14 to 18 hours successively, with a velocity of 2 to $2\frac{1}{2}$ knots, which would make it almost impossible for an indifferent sailer to make any progress against it. It is also said that during the latter part of the S.E. monsoon, it frequently blows hard from the S.W., accompanied with much rain; this would considerably retard vessels going to the southward through the Lucipara channel, and offer a fair wind to those proceeding through the Stanton channel."*

* The following extracts of letters, the first published in the latest edition of Horsburgh, and the second in the Mercantile Marine Magazine of 31st March 1863, will be useful to show the opinion of officers of the mercantile marine upon the advantages of the Stanton channel:—

"Singapore, November 15, 1860.—Finding that all the vessels in company were steering for the Lucipara passage, I immediately altered course and steered for the Stanton channel, being the only one out of 10 or 12 vessels that adopted the new route; probably they were not provided with the recent survey. At six the same evening we anchored at the entrance of the channel. The next morning the wind was dead against us, but the tide being favourable, weighed and turned to windward; a fair breeze springing up in the afternoon enabled us to stem the ebb; and by midnight we were abreast of Lalarie point; had no occasion afterwards to anchor, and was through the strait in 36 hours from the time of weighing. The next day several of the vessels that came through the Lucipara channel were seen far astern; this

WINDS.—The winds in Banka strait follow the direction of the coasts, though with slight variations from the influence of the land and sea breezes ; and fresh breezes may always be expected when working against the monsoon.*

TIDES and CURRENTS.—The tides in Banka strait are strong but irregular, and are greatly influenced by the monsoons. The flood-tide, entering the strait from the southward out of the sea of Java, meets another flood, about the Nangka islands, coming from the northward out of the China sea. The direction of the streams is entirely influenced by the windings of the strait, forming, at their meeting, whirls and eddies in the bights of the land.

In the Lucipara channel and the southern parts of the strait, sometimes there are two, but generally only one ebb and flood in the 24 hours, the former running to the southward and the latter running to the northward. During the months of January, February, and March, at the greatest strength of the N.W. monsoon, the southern current continues often from 14 to 18 hours successively, with a velocity of from 2 to $3\frac{1}{2}$ knots ; the flood-tide is then very trifling, and sometimes not at all perceptible. On the contrary, during the S.E. monsoon, the stream of flood runs sometimes 14 to 18 hours with great velocity into the strait, and the ebb runs out during the other 10 or 8 hours with but little strength.

In the northern parts of the strait during the N.W. monsoon, the southern current or flood remains longer and is stronger than the ebb, and the reverse during the eastern monsoon. The velocity of the tide is sometimes 2 or $2\frac{1}{2}$ knots, and the range from 7 to 12 feet, and sometimes more ; and in the mouth of the rivers the water during the western monsoon, from the heavy rains which prevail at that period, is much higher than during the eastern monsoon.

would show the advantage to be derived from using the Stanton channel. Another feature in its favour is its breadth. Being 3 miles wide in its narrowest part, there is some room to turn a ship to windward ; besides which, the tide setting fairly through prevents a vessel drifting on the sands when becalmed, as is the case of the Lucipara channel. I am persuaded it will eventually be the high road in and out of the strait for square rigged vessels, as any person once adopting it will never use the other.

"At Anjer I met Captain Gell, of the barque *Onyx*, from this port. He beat through the channel and spoke in the highest terms of it, as did Mr. Vaughan, master attendant of Singapore, who was a passenger in the vessel. C. G. March, Commander of the ship *Charlotte Jane*."

Thomas Mitchell, commander of clipper ship *Queen of Nations*, says—"By going through the Stanton channel we were only 15 hours getting through Banka strait. The Stanton channel only wants a trial to be approved of, and if once used would always be adopted in preference to the Lucipara. I have sailed through the latter many times both ways, but will never do so again while such a safe one as the Stanton channel is in existence."

* Java Guide.

Between the monsoons flood and ebb succeed each other generally every 12 hours, and the one or the other is then stronger, according to the wind being northward or southward. The rise of an ordinary tide is 5 to 7 feet, and a spring tide 9 to 10, and sometimes 12 feet; but the average rise seems to be much greater during the eastern monsoon than during the western one.*

Mr. Stanton observes, that on the Sumatra shore, when the monsoon is blowing strong, a constant surface current will be found setting to leeward, and extending nearly mid channel, except between Fourth and Batakarang points, where it is influenced by the numerous branches of the Palembang river.

On the coast of Banka, owing to the formation of the land more regular tides will be found, therefore, ships in working should only keep on the Sumatra side between Batakarang and Fourth points, and when Tanjong Tadah bears N.E. $\frac{3}{4}$ N., work along the Banka coast, as by so doing and leaving either extremity of the strait at low water, they may carry a fair tide all the way through, and generally have the advantage of a land wind at night.

Throughout the strait, a difference of 12 hours in the tides was observed in the opposite monsoon. It is high water, full and change, in the S.E. monsoon about 8 h. 30 m. p.m., but in the N.W. monsoon high water takes place at nearly the same time in the morning.

Eddies in the Bights.—When beating through the middle of the strait during the strength of the monsoons, continuous and contrary currents are certain, and the skilful seaman will therefore find great advantage in availing himself of the eddies, as well as of the more regular changes of tide, by standing into the bights and bays in those parts of the strait where he can safely approach the land.†

Inshore Tides.—In the Toboe Ali channel, also in the bay north of the Nangka islands, and in the passage between Brom-Brom reef and Banka, we meet, even in the western monsoon, a pretty regular succession in the roadstead tides. It has been often observed, when passing the road of Mintok that the vessels were lying with their heads in a contrary direction to those at anchor upon the bank outside. In that road the flood comes from the westward, and the ebb from the eastward; but near the mouth of the Assing river the contrary occurs; the flood there runs west, and the ebb east. In the bays between Eerste and Tweede points, and again between Derde and Vierde points, there are probably eddies of which vessels of light burden may make use, and heavier vessels

* Java Guide.

† Java Guide.

may no doubt, in many places, run close enough to the shore to keep out of the influence of the currents.*

Freshes.—Between Bata-karang and Fourth points the ordinary current in Banka strait after heavy rains is considerably accelerated and diverted in the direction of Kalian point, until it nearly reaches mid-channel, by the freshes from the many rivers in this vicinity. Vessels sometimes take advantage of this to complete water, as it is frequently quite fresh on the surface.

During the westerly monsoon, which is the rainy season, these freshes set out of the rivers on the Sumatra coast with great force, and they require to be carefully guarded against in the night. Upon one occasion, when H.M.S. *Saracen* was at anchor near Lalarie point, her decked pinnacle, moored at the boom, was fairly pressed under the water and swamped by the force of the current.

LUCIPARA ISLAND ; AND COAST OF SUMATRA FROM LUCIPARA POINT TO BATAKARANG POINT.

LUCIPARA ISLAND, half a mile long, W.N.W. and E.S.E., and a quarter of a mile broad, lies at the southern entrance of Banka strait, 9 miles East of Lucipara point, in lat. $3^{\circ} 14' S.$, long. $106^{\circ} 14' E.$, and is visible in clear weather at 14 or 15 miles. It is surrounded by a reef, which from its south-east end extends rather more than $1\frac{1}{2}$ miles ; and around this reef is a bank, with $2\frac{1}{2}$ and 3 fathoms over it, extending about $1\frac{1}{4}$ miles to the north-westward from the island, and 2 miles to the south-eastward of it.

Formerly, the trees on the south-east end of the island rose to a sort of peak 164 feet high, but all the trees on this peak, with the exception of a solitary one in the centre, have been cut down. There will, however, be no difference in the elevation of the island, as this tree is the highest, but the summit now (1860) presents a ragged appearance, and in making the land there will be more difficulty in distinguishing it from the trees on the flat coast of Sumatra.

Rocky Patches.—Lucipara should not be approached on its south-east side nearer than $3\frac{1}{2}$ miles, for a rocky patch with $2\frac{1}{2}$ fathoms water over it lies S.E. by E. $\frac{1}{2}$ E., distant nearly $2\frac{1}{2}$ miles from the island ; and half a mile to the south-westward of this patch is another of 3 fathoms.

LUCIPARA POINT, which forms the south-western limit of Banka strait, is in lat. $3^{\circ} 13\frac{1}{2}' S.$, long. $106^{\circ} 5' E.$ It is covered with trees, the tops of the highest being 89 feet above the level of the sea.

* Java Guide.

THE COAST between Lucipara and First points is formed of mangrove jungle, and was found in the survey of 1859 to extend considerably more eastward than shown in the Dutch chart. This extension has evidently taken place since their survey in 1818, and it may be attributed to the sediment from the numerous small rivers in that vicinity affording more soil for the growth of the prolific mangrove. The contour of the dry mud was obtained and sounded close to at the springs, and it will be a guide to show any farther extension.

The Dutch naval officers have evidently been long acquainted with this fact, and they state that the whole coast of Sumatra facing Banka strait in the bights, and wherever mangrove is found growing, is annually progressing outwards. This remark applies to the bays, and more especially to the outlet of rivers, but not to First, Second, and the other principal points, where a different kind of tree will be found, and the rapid current sweeping round these abrupt points prevents any farther extension taking place.*

GREEN POINT, so called from the trees on it being of a lighter and brighter green than elsewhere, bears N. $\frac{1}{2}$ W., distant 9 miles from Lucipara point, the coast between forming a bight about $1\frac{1}{4}$ miles deep. Between these points is a ridge of high trees standing about $1\frac{1}{2}$ miles back from the coast line, with a conspicuous tree 153 feet high, near their centre.

BERSTE or FIRST POINT, bears N. $\frac{3}{4}$ W. distant $4\frac{1}{4}$ miles from Green point, the coast between forming a bight. The trees on it are of equal height, 60 feet, and present a level appearance.

MUD BANK.—From the southward the coast line approaches Lucipara point in a north-easterly direction ; but the 3-fathoms line, which may be considered the edge of the mud-bank which fronts the whole coast of Sumatra, from a distance of 10 or 12 miles southward of the point, approaches it nearly straight in a N. by W. direction, and passing Lucipara point about 2 miles off, follows, with a slight curve in towards the coast, the same general direction until abreast of Green point, from which it extends a little over a mile ; it then takes a direction a little more westerly until abreast of the south part of First point, from which it is distant three quarters of a mile. In rounding First point, the bank approaches nearer to it, and on its north-east side projects only about a quarter of a mile from the shore.

From 10 or 11 miles to the southward of Lucipara point, to within 2 miles of Green point, the soundings decrease regularly towards

* Stanton.

the bank ; but just to the southward of, and fronting Green point, the water shoals suddenly from 6 to 8 fathoms, and therefore this part of the flat should never be approached into less water than 7 fathoms. Near First point the bank is also steep to, especially on the north-east side, and should not be approached under 12 or 10 fathoms, those depths extending to the distance of 1 to $1\frac{1}{2}$ miles off the point.

THE COAST from First point takes a N.W. by W. $\frac{3}{4}$ W. direction for $6\frac{1}{2}$ miles to False First point, having a small bight or indentation between, at about two-thirds of that distance from First point. From False First point it falls back S.W. by W., about 8 miles, and then forming a deep bay, gradually curves round to a slight point (False Tweede point of the Dutch), from whence it runs pretty straight about N. $\frac{1}{2}$ W. for 7 miles to Tweede or Second point.

FALSE FIRST, or FALSE FIRST POINT.—The trees upon this point are more elevated than those on First point, being 105 feet high. Lalarie point on the Banka side, bears from it N. $\frac{1}{3}$ W. nearly $7\frac{1}{2}$ miles, and Second point N.W. $\frac{3}{4}$ N. $18\frac{1}{2}$ miles.

The mud bank projects two-thirds of a mile from False First point, and more than 3 miles from the shore in the depth of the bay between that point and Second point. The bank is very steep close to, and should not be approached under a depth of 12 fathoms near the points, nor under 10 fathoms in the bight between them.

TWEDE, or SECOND POINT, the trees on which are 81 feet high, bears from First point N.W. $\frac{1}{4}$ N. $24\frac{1}{2}$ miles, and from Lalarie point N.W. $\frac{3}{4}$ W. 13 miles. From this point the coast falls back, and curves round until within 5 miles of Third point, forming a bay about 5 miles deep ; it then runs nearly straight to Third point.

The mud bank extends about two-thirds of a mile from Second point, and being very steep to should not be neared under a depth of 12 fathoms. Between Second and Third points, it runs very nearly straight from point to point, filling up the bay. The soundings here do not, as a general rule, shoal so suddenly as they have been described to do between the other points, but at 2 or 3 miles south of Third point the bank curves out considerably, and is dangerous to strangers, particularly when coming from the northward, as they are likely to infer that the bank falls back in the direction of the land. The depths, too, here again begin to shoal suddenly, adding to the danger, so that it is necessary to exercise caution and give a good berth to this part of the bank.

A SPIT or Horn extends $1\frac{1}{2}$ miles from the above mud flat, and then in a south-easterly direction for 2 miles, with depths from $2\frac{1}{2}$ to 3 fathoms,

mud, on it, and from 4 to 5 fathoms between it and the flat; from its northern extreme Second point bears S.S.E. 8 miles, and Parmassang peak E. by S. $12\frac{1}{2}$ miles; therefore in passing this spit, Second point should not be brought eastward of S. by E. $\frac{1}{4}$ E. until Parmassang peak bears E.S.E.

DOUBTFUL PATCH.—There is said to be as little as 4 fathoms over muddy bottom, with Little Nangka island bearing North, and the middle of Parmassang hill East.

DERDE, or THIRD POINT, bearing N.N.W. $\frac{1}{4}$ W. $20\frac{1}{2}$ miles from Second point, is 78 feet high, and has on its north side a *square beacon* with a *white* top and ball. From this point the coast runs back about W.S.W. for 2 miles to the entrance of a small river, named Songi Kisoegean, which, from native information, is said to connect with a branch of the Palembang river; from thence it curves round in a West and W.N.W. direction for 4 or 5 miles, and then assumes a tolerably straight outline until within 3 or 4 miles of Fourth point, which it approaches in a N.W. by W. $\frac{1}{4}$ W. direction.

The mud-bank does not extend more than half a mile off Third point, but it is very steep-to, and should not be approached under three-quarters of a mile, or in less than 15 to 13 fathoms water. Between Third and Fourth points the bank runs pretty nearly straight, the edge of it being distant from a mile to $1\frac{1}{2}$ miles from the shore, except in front of the bight just to the westward of Third point, where it is 2 miles distant from the shore.

The soundings between Third and Fourth points are irregular, but vessels may, with careful attention to the lead, stand towards the mud bank into 7 or 6 fathoms, until nearly abreast of Fourth point, where the bank gets steeper, having 10 fathoms close to, and only 8 fathoms a little farther off.

FOUR and THREE-QUARTERS FATHOMS BANK.—A mud-bank about 2 miles in length, and three-quarters of a mile in breadth, and having $4\frac{1}{2}$ fathoms water over it, lies between Third and Fourth points, about two-thirds of the distance from the former, and nearly 3 miles from the shore; between this bank and the edge of the mud flat extending from the shore, is a channel about three-quarters of a mile broad, with 7 to 9 fathoms water in it.

VIENDE or FOURTH POINT bears from Third point W. $\frac{1}{2}$ N. distant $23\frac{1}{4}$ miles. The trees upon it are 112 feet high; and a *square beacon*, with *white* top and ball, stands at the edge of the mangrove.

The coast from Fourth point stretches westward for 22 or 23 miles, and in this space the different branches of the Palembang river fall into the strait.

Banks off Fourth Point.—A bank of sand and shells, having $4\frac{1}{2}$ to 6 fathoms water over it, lies 4 miles off Fourth point. It is 3 miles long W.N.W. and E.S.E., about $1\frac{1}{4}$ miles broad, and from its western extreme the beacon on Fourth point bears S. by W. $\frac{1}{4}$ W. 3 miles, and from its eastern extreme the beacon bears S.W. by W. $\frac{1}{2}$ W. 4 miles. Between it and the mud bank extending from the shore are from 7 to 9 fathoms.

Another patch, about a mile in extent, and having 6 fathoms water over it, lies nearly 2 miles north-eastward of the last-mentioned bank, with the beacon on Fourth point bearing S.W. $\frac{1}{4}$ S. $6\frac{1}{2}$ miles, and the dry rocks on the Brom-Brom reef N.E. by N. 3 miles.

Between these banks the depths are from 8 to 14 fathoms.

The MUD BANK from FOURTH POINT takes a W.N.W. direction for 18 miles, where it trends away nearly South, forming one side of the entrance to the Soengsang river; a spit projecting from the land forms the other side of the entrance to that river, as also the south-east side of the entrance to the river Assing.

CAUTION.—This bank for 6 miles westward of Fourth point is composed of hard sand, covered with a thin stratum of soft mud, and is exceedingly dangerous, being steep-to, and many ships, including H.M.S. *Himalaya* and *Assistance*, have grounded upon it. The lead cannot at all be relied upon for giving warning in time to avoid it, for 11 fathoms may be had and the ship be aground the next instant. The safest plan is not to pass the beacon on Fourth point within 3 miles, and having passed it not to bring it to the eastward of S. E. $\frac{1}{2}$ S., until Monopin hill bears North.

From 10 to 12 fathoms will be obtained very close to this steep bank, outside of which is a long strip of 8 and 9 fathoms; outside of this strip are 10 to 13 fathoms, so that it is not at all possible for a vessel to discover her position by the lead only. The soundings, however, become more regular off the mouths of the Palembang rivers, and towards and abreast Batakarang point the lead will in those localities, if properly attended to, enable a vessel to proceed with ease and safety, as the soundings decrease regularly towards the shore.

Great care, however, is requisite in navigating this part of the strait during the rainy season, for large drifts are then brought down these rivers by the freshes, which set strong over to the west end of Banka; and as the flood runs strong into them on the springs, a vessel may be driven too near either shore, both sides of which are fronted by dangers (*see also* page 56).

SUMATRA RIVERS.—To the westward of Fourth point are the entrances of the rivers Saleh and Oepan, then the Soengsang, and lastly

the Assing ; the last two are navigable for vessels of light draught as far as Palembang.

SOENGSAK or PALEMBANG RIVER.—Mr. Stanton has furnished the following account of this river and town :—Since the survey of the north-west part of Banks strait in 1860, a deeper and more direct entrance to the main channel of this river has been formed, carrying 9 feet at low, or 22 feet at high water springs.

This new entrance is marked with beacon poles, similar to those in the old passage, but as, on account of the many floating trees and strong freshes, they will probably not remain long in their position, a vessel of large draught may safely enter at high water by bringing the trees forming the west point of the river entrance S. by W. $\frac{3}{4}$ W., and running for them on that bearing until Pulo Payong (Umbrella island) bears South ; then steer for the island, but take care in approaching it to keep close to the eastern bank of the river, to avoid the spit extending 2 miles off its north end. If a pilot is required one may be obtained at Kampong Soengsang, the small village on the left bank, but there is no channel available for ships on the west side of Payong.

This branch of the Soengsang at its entrance is upwards of a mile wide, but within the navigable channel is contracted in some places to the width of a cable's length by the different islands and banks, until close up to the town of Palembang, when the river widens to three-quarters of a mile with 5 and 6 fathoms close to the shore.

Vessels can navigate the whole length of the river up to the town by keeping close to the right bank ; but those of large draught are recommended, when passing Pulo Singris and the bank off Kampong Maya, to keep near the opposite shore. Both sides of the river are wooded, and on nearly all the isolated banks there are small trees, and on others fishing stakes, consequently there will not be much difficulty in avoiding them.

PALEMBANG, one of the largest Malay towns in the Archipelago, and the largest in Sumatra, derives its name from the many bridges across the numerous creeks that intersect it. A Dutch resident and other officials reside here, and to support their authority there is a military force consisting of one European and two native companies. The total number of Europeans in the town is 109, and by the last census the native population consisted of 45,000 Malays, 4,000 Chinese, and 1,000 Arabs. The climate in the vicinity is considered so salubrious that convalescent soldiers are sent here from Banka.

Near the extreme end of the town, commanding the mouth of the Ogan river, is a substantially built fort. It is a square enclosure of masonry, with walls 8 feet thick, about 50 feet high, loop-holed, and at each angle a circular bastion mounting 8 guns in casemate embrasures. The fort could

easily accommodate 1,500 men, and is surrounded outside with strong wooden palisades, a thick bamboo hedge, and a ditch 20 feet broad. The fort is in lat. $2^{\circ} 59\frac{1}{2}'$ S. There are several smaller forts some distance up the river.

Covered prahus (called bedahs) daily arrive from the interior, laden with large supplies of cotton for exportation. This useful article grows quite wild some distance up the river, in some places close to the stream, and covering many miles of land. The greater portion of it is sent to Batavia. The total quantity exported this season is estimated at 1,735,500 lbs.

All the necessaries of life are here found in abundance. The country abounds in large game, deer, wild pigs, &c. The river swarms with fish. Beef, fruit, vegetables, &c. are cheap and plentiful. Foreign vessels are not permitted to trade, and Dutch European vessels are not allowed to enter the river unless under special circumstances. The export trade, consisting principally of pepper, rattans, cotton, honey, dye woods, and gutta-percha, is confined to 13 European built ships, and numerous country craft, all owned by wealthy natives.

From November to March rains prevail, and the wind varies from N.W. to N.E. At this period vessels belonging to Palembang either remain in port or trade to other places, as it is almost impossible for sailing vessels at this period to make any progress up the river against the freshes. During a stay of five days off the town in January, the influence of the flood was not once felt. The ebb slackened during the day, but at night it often ran 5 knots. After much rain the freshes out of the river are felt in Mintok bay.

ASSING or SALT RIVER* offers the best passage to Palembang, being at all times navigable for vessels of the heaviest burden, but the shallow at its entrance often causes a delay of several days. At its mouth, which was surveyed in the beginning of 1846, Monopin hill bears N.E. by E., and Assing point N.W. by N. At the entrance, in mid channel, there are 8 to 10 fathoms; and close to the poles at the bank on the eastern side of the channel from 4 to 5 fathoms. Higher up this river the Pontian and Jarang channels are just as good as that through the Soensang.

DIRECTIONS.—To enter the Assing, bring Monopin N.E. by E., and Teloo point N.W. by N., then steer in a S.W. direction, according to the state of the tide, for the ebb runs strongly over the very shallow outer bank towards Soensang, and the flood towards the inner banks.

Having reached as far as Api point, take the mid-channel, between the beacon-poles, towards Bayam point, and then, though still following the

* Java Guide.

middle of the river, keep rather towards the Laga point side, round which the Pontian channel is entered. With a flood tide keep on the eastern shore, as the stream runs with force past that channel; taking care, at the same time, to avoid the shoals which surround the point. In this river we have only to mind the points, as from most of them project small mud banks.

Pontian and other Affluents.—The junction of the rivers Pontian, Kietjar, Gassing, and Sebalick, which last unites the Pontian to the Jarang, causes a part of the ebb to run from the first two rivers through the Sebalick, and compels vessels having come so far with the flood to anchor and to wait for the ebb. The Pontian is generally deepest on its western side, except near its mouth, where the greatest depth is in the middle; but again towards the western side, higher up, and in front of the shoal off the point, between the Kietjar and the Sebalick. When near its junction with the Sleino and Jarang rivers, keep close to the eastern shore, in 6 to 8 fathoms, to avoid the reef which projects from the point between the Sebalick and Jarang. When there is no wind it is necessary to anchor and wait for the flood coming up by the Sleino, in order to proceed up the Jarang, and it will be found that a great part of the flood goes into the Tambangadin river, while that going up the Jarang is very trifling. Having reached the Jarang Ketjil, anchor again till high water, to wait for the ebb from this river, which will soon take the vessel into the Soengsang.

Jarang Bank.—The bank off the Jarang is very shallow, but on the north side there is a narrow passage with 5 or 6 fathoms. Vessels of less draught than 15 feet can also find a passage on the south side.

The Assing, always navigable.—The difficulties in going up the Assing, caused by the narrowness of the rivers Pontian, Sebalick, and Jarang, and the necessity of stopping so often to wait for the tide, are amply compensated by the advantage that vessels of even the greatest burden suffer no delay at its mouth.

Freshes.—Vessels navigating these rivers, especially during the western monsoon, should be aware that the heavy rains in the interior cause such strong freshes to run out of the river as to reach towards the opposite shore, and that in the spring, especially during the eastern monsoon, very powerful floods pour into the rivers. High up the rivers are seen rippings like breakers, caused by these tides and freshes, which frequently bring down large detached masses of grass and brushwood like floating islands.

BATAKARANG POINT, the north-west boundary of Banka strait, is in lat. $2^{\circ} 1' S.$, long. $104^{\circ} 50' E.$, and bears N.W. $\frac{3}{4}$ W. 32 miles from Fourth point. It may be known by a group of trees, 180 feet high, which gives it a bluff and jagged appearance.

Valsche or False point is more sloping and flat, and lies 9 miles to the

south-eastward of Batakarang point ; and there is another point about 3 miles in the same direction from Batakarang point.

The mud-bank projects $4\frac{1}{2}$ miles off Batakarang point, and 2 miles off False point ; it then trends away to the south-westward, bounding the entrance of the Assing river on its northwest side, to Tanjong Kampie, from which it projects not quite a mile.

The soundings off Batakarang point are regular, and the point may be passed in from 6 to $4\frac{1}{2}$ fathoms water.

SOUTH COAST OF BANKA.

This coast, which separates the straits of Banka and Gaspar, is treated of here, as being intimately connected with the former, for Mr. Stanton observes that at the entrance of Banka strait, in the S.E. monsoon, the ebb tide during the night at springs will be found setting to the south-eastward ; consequently many vessels, although steering a course for the strait, get set between Pulo Dapur and Baginda point.

This part of the south end of Banka island being almost a blank (on the Dutch chart), was surveyed by the *Saracen*, and the coral reef searched for, reported as lying 15 miles from the south end of Banka, (see foot note page 66.)

The coast between Baginda point and the Dapur islands, in extent about 14 miles E. $\frac{3}{4}$ N. and W. $\frac{3}{4}$ S., is generally low, and covered with trees ; it presents, however, some points sloping down from hills of moderate elevation. It should not be approached under 3 miles, for it is fronted with a mud-bank extending in places nearly 2 miles from the shore, upon which are many rocks above, and many others below water.

TANJONG BAGINDA, the south-eastern extreme of Banka, is in lat. $3^{\circ} 5' 20''$ S., long. $106^{\circ} 45'$ E. It slopes gradually in a south-easterly direction from a hill 387 feet high, which rises a mile inside the point. Two miles inside the point, in a N.W. by W. $\frac{1}{2}$ W. direction, is another hill, named Baginda peak, 521 feet high.

TANJONG DUA bears E. by S. $\frac{3}{4}$ S. $2\frac{1}{2}$ miles from Baginda point, from which it is separated by a bay about half a mile deep. N.N.W. $1\frac{1}{3}$ miles of the point is a hill 432 feet high, from which the land slopes down to the coast.

Rocks, some of which are above water, extend to the southward of this point and for more than a mile along the coast to the westward, to the distance of half a mile. A sand-bank, with rocky patches, commences about $1\frac{1}{2}$ miles S.S.E. $\frac{1}{2}$ E. from it, and extends to the westward until it meets the mud-bank which fronts the coast as far as Tanjong Tanah Roboe.

TANJONG KEJANG is 231 feet high, and bears West-southerly $2\frac{1}{2}$ miles from Tanjong Dua, from which it is separated by a sandy bay about two-thirds of a mile deep.

KARANG LAYAR is a rocky reef above water, lying on the outer edge of the bank above mentioned, and S.W. by W. distant $1\frac{1}{2}$ miles from the east extreme of Tanjong Kejang. Inside these rocks to the north-westward is another bed of rocks, some of which are above water.

TANJONG BANTIL, 240 feet high, bears W. by N. $2\frac{1}{2}$ miles from the nearest part of Tanjong Kejang. The bay between these points seems to be full of rocks; and large and small rocks above water, with others awash, extend to the southward of the point, nearly to the edge of the mud-bank which projects nearly a mile off shore.

TANJONG TANAH ROBOE is $3\frac{1}{2}$ miles W. by S. $\frac{1}{2}$ S. from Tanjong Bantil, and off it, as at Tanjong Bantil, a number of rocks, some above and others below water, project nearly a mile to the southward to the edge of the bank; the bank curves round this point, and terminates just to the westward of it.

DAPUR POINT.—The coast from Tanjong Tanah Roboe runs West about a mile, and then curving to the north-westward into a small bay about half a mile deep, runs about S.W. by W. with a rugged outline to Dapur point, under Toboe Ali Lama peak, which forms the south-western extreme of Banka. Adjoining Dapur point is an islet or rock 40 feet high, with smaller rocks above water on both sides of it.

DAPUR ISLANDS * are two islets lying a little more than a mile S. by E. from Dapur point, and forming the south-eastern limit of the entrance to Banka strait by the Stanton channel. They are nearly round, about a cable's length in diameter, and connected at low water by rocks. The southern one is 120 feet high, resembles a shoe in appearance, and is fronted by a coral sandy beach; some rocks above water lie about a cable's length to the southward, and a rock under water about 2 cables, to the south-eastward of the islet.

There is a narrow channel, half a mile wide, with depths of $5\frac{1}{2}$ fathoms, between the Dapur islands and Dapur point; from thence to Nangka point there are several white rocks lying inside the mud flat close to the shore.

SAND RIDGES OF THE SOUTH END OF BANKA.—H.M.S. *Saracen* when searching for the coral reef reported by the Netherlands barque

* Dapur, means cooking place. Prahus, in passing, generally land on these islands to catch turtle, as it is the only place in Banka strait where they are seen.

Banka,* (many prominent points offering good objects for fixing her position,) she was enabled to extend the soundings 20 miles off the land. When anchored near the reported position of the coral reef, several vessels passed south, from 1 to 6 miles distant; therefore it was useless to continue the search any farther in that direction, as it would have taken the *Saracen* directly in the track of vessels bound for Gaspar strait, where it is improbable that a reef of this extent should exist, and no other vessels have reported it.

The soundings were found to be very irregular, long sand ridges, with deep water over a muddy bottom between. None of these banks have less than 5 fathoms on them, with the exception of one lying S.E. $1\frac{1}{2}$ miles from Pulo Dapur, where there are several patches of $3\frac{1}{2}$ fathoms over a sandy ground. At 7 miles E. by S. of these patches, and separated by deeper water, is a bank of $4\frac{1}{2}$ fathoms, coral and sand, extending in an easterly direction for 3 miles; it appears to be a continuation of the Dapur bank, and from its shallowest part Tanjong Baginda bears N.E. by N. 6 miles.

This survey will now give mariners confidence to approach the south coast of Banka to 3 miles, and enable them at night to know their position by the soundings. As no soundings appear to have been taken by the vessel that discovered the coral reef, and as its position is placed directly in the track of ships bound to Banka or Gaspar strait, and might occasion great delay to them by unnecessarily having to alter course, Mr. Stanton recommends that the reef should be erased from the charts, one of the overfalls mentioned below being probably mistaken for a reef.

Overfalls.—At full and change great overfalls were repeatedly noticed, caused by the meeting of the ebb stream from Banka and Gaspar straits over an uneven bottom. This has also been noticed by other navigators, and ships were formerly cautioned not to approach the south end of Banka nearer than $4\frac{1}{2}$ leagues.

SOUTH-WEST AND WEST COASTS OF BANKA; AND FREDERICK HENDRICK ROCKS.

TOROH ALI LAMA is a hill about $1\frac{1}{2}$ miles N.N.E. of Dapur point. Its peak is of pyramidal form, and rises to an elevation of 512 feet.

* This coral reef, about 3 miles in circumference, and probably only 6 feet water on it, was reported as lying 15 miles from the south end of Banka island. Its position was given as lat. $3^{\circ} 21' S.$, long. $106^{\circ} 41' E.$, and the land in sight (probably Mount St. Paul, 930 feet high) bore N.N.W.

NANGKA POINT is 2 miles N.W. from Dapur point, and the coast between is fronted by rocks extending about half a mile from it. The edge of the bank is nearly a mile from Nangka point, and has 5 fathoms water close to, so that it must be approached carefully. The point may easily be distinguished by a round hillock over it 264 feet high, and also the land receding, forming Toboe Ali bay, the shore of which is low, and fringed at high water with sandy beaches inside the mud flat, which here extends 2 miles off the land.*

TOBOE ALI POINT, bearing N.W. by N., distant $5\frac{1}{2}$ miles from Nangka point, has several white rocks near it, and a conspicuous tree on its summit, which is 213 feet in height, and visible 14 miles off.

TOBOE ALI FORT, with its red-roofed barracks, stands half a mile south-east of Toboe Ali point, upon a low mound 40 feet in height, at the left point of entrance of a small river, on the banks of which is the village of Sabang, situated close to the fort, and containing (in 1860) a mixed population of 600 Malays and Chinese. At low water the river dries to a distance of 3 cables' lengths from its mouth. A Dutch Administrator and a Captain with a small military force garrison the fort.

The anchorage off Toboe Ali fort is in 4 fathoms, mud, with Toboe Ali Lama peak S.E. by E. $\frac{1}{2}$ E., and Gadong peak in line with Toboe Ali fort N.E. $\frac{1}{2}$ N.; smaller vessels may approach on this bearing nearer the shore as the soundings decrease regularly. In southerly and south-westerly winds there is a heavy swell here which makes landing difficult.

Supplies.—No supplies of any description can be procured but water and wood; the former may be obtained at the above river, or at a small stream half a mile to the eastward of it, from half flood to half ebb.

MOUNT ST. PAUL, 5 miles E.N.E. from Toboe Ali point, rises with a gradual acclivity on its south-eastern shoulder to a peak 990 feet in height, with two others adjoining of nearly the same elevation, the western peak terminating rather abruptly to a lower spur in the direction of Gadong hill. When to the westward of Puni island, owing to a projecting spur from the middle peak, the eastern peak of St. Paul is hidden, and the western one then appears the highest, and forms, with the north-west brow, a saddle hill.

GADONG HILL is a pyramidal peaked hill 593 feet high, W. by N. distant nearly $2\frac{1}{2}$ miles from Mount St. Paul.

* The shore mud-bank which fronts the coast between the Dapur islands and Lalarie point is described at page 69; between Lalarie point and the Nangka islands and Tanjong Tedong at page 72; and between Tanjong Tedong and Mintok bay at page 75.

Owing to the land contiguous to these hills and to Toboe Ali Lama being low, they appear as islands at a distance over 15 miles.

GOSSONG POINT bears N.W. by W. 4 miles from Toboe Ali point, the land between forming a deep bay with low mangrove trees. A small stream falls into the sea on the north side of the point.

From Gossong to Laboh points the land is more elevated, the highest part being 250 feet in height, with rocky points and sandy beaches, between which are numerous rocks close to the shore.

PUNI ISLAND, lying midway between Gossong and Laboh points, is a small islet, 47 feet in height, and conspicuous from the white granite rocks forming its base, and other rocks of a similar appearance near it.

LABOH POINT bears N.W. $\frac{3}{4}$ W. distant 12 miles from Nangka point. There is a hill, 250 feet high, about a mile to the eastward of it, and another, about the same height, and the same distance, to the northward. This point from the south-eastward presents rather a shelving appearance, with large white rocks extending from it, which, when seen from the westward, have the appearance of a village, from the contrast they offer to the green verdure of the point. Prahus frequently anchor here.

DAHUN POINT is $7\frac{1}{2}$ miles N.W. by W. $\frac{1}{4}$ W. from Laboh point, and the shore between is low and covered with mangroves: a range of hillocks runs parallel to the coast, the highest of which is elevated 230 feet; there are also several small rivers.

The land at Dahun point attains a greater elevation, and is faced with sandy beaches and rocky points. At $4\frac{1}{2}$ miles N.N.E. $\frac{1}{4}$ E. from the point is a round woody hill, 315 feet in height, and conspicuous from the high trees on it, and from there being no other hills near it.

Sail Tree.—Close to the coast, 2 miles N. by W. $\frac{1}{2}$ W. from Laboh point, is a remarkable square tree, 167 feet high, which is very conspicuous, there being no others of the same elevation near it: in clear weather it may be seen 12 miles off, closely resembling a ship under sail.

PULO DAHUN, 30 feet in height, is one of a cluster of rocks lying off Dahun point, nearly all of which are covered at high water. It is remarkable by its having a solitary tree on it, whence its name, Dahun, in Malay meaning leaf or bough.

PANJANG HILL (or Long Hill) rises close to the coast between Dahun and Banka points. When seen from the south-eastward it shows as a wedge, with its greatest elevation, 316 feet, on the eastern end. From the north-westward it appears as a long hill rising to a peak near its centre, with a conspicuous gap between the trees.

Water.—A stream of fresh water runs close to the north side of this

hill; the coast between it and Pulo Besar is low and covered with mangroves, off which there are several ledges of rocks.

BANKA POINT and HILL.—Banka point is $12\frac{1}{2}$ miles N.W. by W. $\frac{1}{4}$ W. from Laboh point, and the land to the westward of it recedes into a bay. The point is about the same elevation as Pulo Besar, but at $1\frac{1}{2}$ miles to the northward it rises to Banka hill, which from the south-eastward appears of similar shape to Panjang hill, but differs in having the highest part on its western extremity. From the north-westward it shows with a flat top, having three clumps of trees on its summit, the whole height being 256 feet.

PULO BESAR is nearly connected with Banka point by rocks. Although its name in Malay signifies large, it can only be so in comparison with Pulo Dahun, it being but 3 cables in extent and 63 feet high.

The COAST, from the foot of Banka hill, takes a W.N.W. direction for about 4 miles, when it turns more to the northward to the entrance of a small river; from thence it curves round, forming a small bay to Pudi point, when it runs pretty straight for 5 miles in a W. by N. direction, to Lalarie point. The coast is covered with mangrove trees, and assumes the usual irregular outline of such coasts. The trees upon Pudi point are 108 feet high, and form two mounds, with a small gap between them.

Mamelon Hummock is a small round hill 265 feet high, standing by itself 3 miles inland in a N. by E. direction from Pudi point.

Two miles and a half E. by N. of the Mamelon is another small hill; $2\frac{1}{4}$ miles N. by E. of which is a double peaked hill, 396 feet high; and about $1\frac{1}{4}$ miles East-northerly of this last, is a hill 471 feet high, with a small range running from it to the northward, and another to the north-eastward.

LALARIE or LANGGONG POINT, 75 feet high, is very conspicuous, having a clump of trees on its extremity; those around it (in 1863) have been cut down, and their trunks whitewashed. Formerly it presented a bold bluff appearance on all bearings, and may be expected to do so again if the trees be allowed to grow. It is the turning point into the main part of the strait for vessels that have passed through the Stanton channel.

SHORE MUD-BANK.—A mud bank fronts the whole coast just described between Dapur and Lalarie points. The 3-fathoms line may be considered to mark its edge, which, in most places, shoals very quickly inside that line.

From the rock close to Dapur point, the edge of this bank extends off only about a cable's length, when it curves outward, passing Nangka

point about three-quarters of a mile off ; it then falls back a little towards the outline of Toboe Ali bay, and passing Toboe Ali point about $1\frac{1}{2}$ miles off, assumes an irregular outline towards Laboh point, from which it projects but three-quarters of a mile. After running past Laboh point to the north-westward for about 8 miles, it curves back, forming a sort of horn, projecting in an opposite direction ; from this horn patches of bank extend to abreast of Toboe Ali point. These patches are generally about 2 miles long and very narrow ; they have $2\frac{1}{2}$ and 3 fathoms of water over them, and lie between the sand-bank forming the eastern limit of Stanton channel, and the mud-bank fronting the shore.

The outer edge of the horn just described lies about W.S.W. distant 2 miles from Laboh point ; the bank from this runs pretty straight in a N.W. by W. $\frac{1}{2}$ W. direction for 2 miles beyond Pulo Dahun, where it forms another horn or spit, from which the eastern bank of the Stanton channel extends away to the south-eastward (*see* page 85). From this second horn the edge of the bank assumes a somewhat regular outline towards Lalarie point ; extending about a mile off Pulo Besar, the same distance off Pudi point, and about three-quarters of a mile off Lalarie point. The whole of this part of the bank is very steep-to, there being 6 fathoms close to the 3-fathoms line, and, in many places, but 3 feet just inside it : it must not be approached under a depth of 10 fathoms.

CASUARINA POINT, so called from a number of Casuarina trees on it, is nearly midway between and nearly in the same line of direction as Lalarie and Brani points. The coast between is low, with sandy beaches at high water mark ; several hills, from 300 to 400 feet high, rise at 3 to 4 miles inland.

BRANI, or BOLD POINT, 11 miles N. by W. $\frac{3}{4}$ W. from Lalarie point, is a termination of a spur from the Parmassang range, with a conical peak 516 feet high over it showing very prominently both from the northward and southward.

TIMBAGA ROCKS (or Copper rocks), so called from their reddish colour, are three small rocks, lying East and West of each other, about a cable's length in extent. The highest and westernmost rock is 4 feet above high water, and from it Second point bears W. $\frac{1}{4}$ N. $5\frac{1}{2}$ miles, and Brani point N. by E. 3 miles. With a setting sun their reddish colour, from the contrast to the green verdure of the land, makes them readily identified, but to render them more conspicuous at high water, and in the forenoon when they are not so clearly seen, a white conical *beacon*, surmounted with a ball, has been erected on the highest rock, and the whole height being 24 feet will make it visible in clear weather at 6 or 7 miles. Shoal water, about half a mile in breadth, extends nearly half a mile to the northward

of the group, and $2\frac{1}{2}$ miles to the southward, and forms, with the shore and bank of Banka, a channel three quarters of a mile wide.

Several shoal patches of coral and sand have been found nearly $1\frac{1}{2}$ miles W.N.W. from these rocks, but they are all inside the 10 fathoms line, the depth vessels are cautioned not to go within when passing them (see page 94). These patches are about a cable's length apart, have 2 fathoms least water on them, and 8 fathoms close to. In approaching them the soundings shoal suddenly from 20 to 10 fathoms. As a guide to lead ships clear, a temporary *black* buoy has been placed in 4 fathoms on the outer patch, about 2 cables' lengths westward of the shoalest water.

From the middle patch of 2 fathoms the Timbaga rocks appear nearly in line with a sharp peak (380 feet high) south of Bukit Limmaun, bearing E.S.E.; and the apex of a distant long hill (657 feet high) is just open west of a white rock off Tanjong Bedaauw, N. by E. $\frac{3}{4}$ E. These patches and the Timbaga rocks will be avoided by not bringing Lalarie point south of S.E. $\frac{1}{2}$ S., until Brani peak bears E. by N. $\frac{3}{4}$ N.

A rocky bank, about a mile in extent east and west, and half a mile north and south, having 7 to 9 fathoms water over it and 14 to 20 fathoms close to all around, lies W.N.W. of the shoal patches just mentioned. From its outer edge the largest of the Timbaga rocks bears E. by S. $\frac{1}{2}$ S., distant 3 miles, and Brani peak E.N.E. 5 miles. Lalarie point, bearing S.E. $\frac{1}{2}$ S., which leads clear of the Timbaga rocks and the above-mentioned patches, also leads just outside the edge of this bank.

WATER may be procured at a stream about half a mile to the northward of the Timbaga rocks, from half flood to half ebb, after which the mud prevents a boat approaching near the shore.

PARMASSANG RANGE is a chain of hills running from Brani point in a N.E. by N. direction for nearly 4 miles, to the highest peak, which rises to an elevation of 1,608 feet; the range then turns more to the eastward, for a distance of about 3 miles, where it disappears.

When seen from the northward, a peak, which is not the highest, appears to be so, owing to the north-easterly direction of the chain. A spur of the range runs in a N.N.W. direction towards the coast, the end of which, named Bukit Salle, is 442 feet high.

TANJONG BEDAAUW is a bold headland, N. $\frac{1}{2}$ E. $3\frac{1}{2}$ miles from Brani point, the coast between forming a bay half a mile deep. A conspicuous white rock, 45 feet high, lies immediately off the point.

PULO PEMBIN is a small round island, 59 feet high, lying N.W. by N. 2 miles from Bedaauw point.

TANJONG KARRAE, 171 feet high, bears N.N.E. $\frac{1}{2}$ E. nearly 3 miles from Tanjong Bedaauw; many rocks, some above and others below water, extend more than half a mile off this point.

SLAN BAY.—The coast from Tanjong Bedaauw falls back to the eastward, and between Tanjong Karrah and a point about 2 miles to the eastward of the Nangka islands is a deep shallow bight, named Slan bay, into which the rivers Kotta and Slan disembogue. From the latter point the coast runs, with a slight bend in towards a small river, about N.W. $\frac{3}{4}$ N. $3\frac{1}{4}$ miles to Tanjong Tedong.

The entrance of the Kotta river is $2\frac{1}{2}$ miles north-eastward of Tanjong Karrah; and the entrance of the Slan is East-southerly, about 5 miles from the south point of Great Nangka island.

On the coast line in the depth of Slan bay is a conspicuous tree 196 feet high.

Slan is the chief town of a pangkal, or district, and is municipally governed by the administrator of the tin mines; here, as at all other chief towns of districts, a small number of Dutch troops are stationed.

SHORE MUD BANK.—The edge of the bank (page 69), is nearly a mile outside Lalarie point, and from thence its direction is nearly straight, about N. by W. for $18\frac{1}{2}$ miles, or for $2\frac{1}{2}$ miles beyond Pulo Pemein, passing Casuarina and Brame points a little less than half a mile. It then assumes somewhat the form of Slan bay which it fronts, and surrounding the Great Nangka island projects a couple of spits or horns towards the bank extending northward from the middle Nangka; from thence the edge falls back in a north-easterly direction towards Tanjong Tedong, from which it extends little more than a mile.

About two-thirds of a mile south-westward of Tanjong Bedaauw, a narrow inlet, having $3\frac{1}{2}$ to 5 fathoms depths of water, runs into the bank in a north-westerly direction, and turns to the northward nearly as far as Pulo Pemein.

Northward of the Timbaga rocks the bank may be approached to 8 or 7 fathoms, as far as a mile or two to the northward of Pulo Pemein, when vessels may stand into 7 or 6 fathoms, until near the Nangka islands, which should not be approached on the west side nearer than 12 fathoms.

THE NANGKA ISLANDS, three in number, lie about the middle part of the strait, from $1\frac{1}{2}$ to 4 miles distant from the shore of Banka island, and 8 or 9 miles eastward of Third point, on the Sumatra coast. Great Nangka, 285 feet high, is $1\frac{3}{4}$ miles long north and south, and $1\frac{1}{4}$ miles broad; Middle and West Nangka are each about half a mile long, the former being 125 feet, and the latter 205 feet high.*

Great Nangka is nearly half a mile within the edge of the mud-bank which extends from the Banka shore. From the Middle Nangka a bank of 2 to 3 fathoms extends S.S.E. $1\frac{1}{4}$ miles; from West Nangka a similar

* See Plan of Nangka Islands on Chart No. 2,149.

bank projects to the southward for nearly a mile, and S.S.E. distant three-quarters of a mile from its tail is a $3\frac{1}{2}$ -fathoms patch.

A small flat rock, 6 feet above water, named West reef, lies about $1\frac{1}{2}$ cables' off the west end of West Nangka; and another 32 feet high, named Tree rock, lies nearly one-third of a mile south-eastward of Middle Nangka, between it and Great Nangka.

A reef, named North reef, with rocks above and below water, lies a quarter of a mile off the north end of Middle Nangka, the mud bank extending off in the same direction about a quarter of a mile farther.

Between the banks which surround the islands are intricate channels from 2 to 4 cables broad, having from 4 to 7 fathoms water in them.

Water.—There is a stream of water on the west side of Great Nangka, and another and smaller stream on the north-east side; but both streams are frequently dry in the S.E. monsoon, and owing to the mud flats surrounding the island, the watering places are difficult of approach for ships' boats. H.M.S. *Belleisle* was watering at Great Nangka night and day, and only filled 30 tons in 36 hours.

The natives are not to be trusted, but on the contrary much caution is necessary while watering, not to leave the casks, &c. without a sufficient number of men to protect them. The *Belleisle* nearly lost one of her crew by inadvertently leaving him alone for a few minutes.

Anchorage.—The south extreme of Great Nangka bearing E. $\frac{1}{2}$ N., leads about half a mile southward of the bank extending S.S.E. of the Middle Nangka; and Tree rock N. by W. $\frac{1}{2}$ W., clears the mud-bank off the west side of Great Nangka nearly the same distance. A ship can anchor, with both these bearings on, in 5 fathoms, and be about $1\frac{1}{2}$ miles from the watering place; she should, however, approach this position with caution, and not attempt to go closer in.

TIDES.—In the N.W. monsoon it is high water, full and change, at the Nangka islands at 7h. a.m., and the rise is about $9\frac{1}{2}$ feet. Many eddies and small races will be met with in the vicinity of these islands; they are caused by the tidal flood wave from the China sea meeting the flood from the southward.

TANJONG TEDONG, bearing N.E. by E. $\frac{1}{2}$ E. $3\frac{1}{2}$ miles from the West Nangka, is a conspicuous point, 234 feet high, inside the Nangka islands, to which it is connected by the mud-bank. A large cluster of rocks, some above and others below water, lie about a mile north-westward of the point, only a short distance from the edge of the mud-bank.

The COAST from Tanjong Tedong falls back to the north-east into a bay, at the bottom of which is the small river Semboelan; from thence it curves to the north-west to Tanjong Penegan, from which it again falls back about a mile to the entrance of a small river of that name. The coast

line from this river rounds the foot of the higher land sloping down from Mundo peak, and then forming a small bay, trends N.N.W. to a point bearing E. by S. 2 miles from the largest of the Meddang islands, when it again bends to the north-east for $1\frac{1}{2}$ miles to the entrance of the Mundo river.

From the Mundo river the coast trends to the north-west about 8 miles to Tanjong Jurung-patt, forming the shore of Mundo bay, with a point about the centre of it projecting nearly a mile. The shore of this bay is low, and covered with trees, which, at the entrance of the Kotta Waringin river, are 121 feet high. Tanjong Jurung-patt, 240 feet high, is the western limit of Mundo bay. The land here begins to be more elevated, and continues to be so as far as the entrance of the Jiring river.

The coast from Tanjong Jurung-patt takes a westerly direction for nearly 3 miles to Tanjong Raya, where it falls back northerly about a mile to the Tempelang river; from thence it takes again a westerly direction for nearly 4 miles to Tanjong Ressam, the eastern extreme of Jiring bay. This latter point is prominent, and faces the south-west; it lies N.W. by W. 12 miles from the Meddang islands.

Jiring bay is the deep bight between Tanjong Ressam and Tanjong Tadah, the coast trending away from the former point in a N.N.W. direction to the entrance of the river Jiring, and from thence curving round about W.S.W. and S.W. to Tanjong Tadah, which bears from Tanjong Ressam W. $\frac{1}{2}$ S., distant $8\frac{1}{2}$ miles. The shore of the bay is low, with three conspicuous trees 152 feet high in its north-west part. Tanjong Tadah, 203 feet high, is readily recognized, the land on both sides being lower and curving into two bays, giving it a very prominent appearance.

Between Tanjong Tadah and Tanjong Puni, which lie nearly East and West of each other, about 8 miles apart, there are two bays, each about three-quarters of a mile deep, with a point having a hummock or mound 256 feet high upon it midway between.

Tanjong Sukal, 2 miles E. by N. from Tanjong Puni, has a hill 209 feet high upon it, and a small river on its west side.

Tanjong Puni is low, and the coast line rounds away very gradually on either side of it. From thence to a point $7\frac{1}{2}$ miles to the N.W. by W. $\frac{1}{2}$ W., the coast falls back and forms a bay about a mile deep; from the latter point to Kalian point, the bearing is W. $\frac{3}{4}$ S., and the distance nearly 4 miles, the coast between forming Mintok bay.

Conspicuous Landmarks.—There are several hills from 100 to 600 feet high on the part of the coast just described between Tanjong Tedong and the Mundo river; Mundo peak, 512 feet high, and bearing E. by S. $\frac{1}{4}$ S. 4 miles from the Meddang islands, is the most convenient for fixing the vessel's position.

About three-quarters of a mile to the eastward of the Tempelang river is a small hill 263 feet high ; and N.E. 3 miles from its entrance, is Bukit Tempelang, a hill 412 feet high ; W. by N. $\frac{3}{4}$ N. from Bukit Tempelang is Bukit Pandin, 585 feet high, which will be found very useful when in this part of the strait.

Solitary Sharp peak, 661 feet high, is the summit of a sharp cone hill standing by itself, N. $\frac{1}{2}$ E., distant $10\frac{1}{2}$ miles from Tanjong Tadah ; this is also very useful when brought in line with nearer objects, for giving a correct line of direction.

Four or 5 miles inland from the coast between Puni point and Mintok are some hills, one of which, Bukit Beloe, 773 feet high, serves as a mark to clear the Brom-Brom reef and Amelia bank ; a little to the westward is another hill 427 feet high.

About 2 miles north-eastward of Bukit Beloe is Bukit Panjang, or long hill, 661 feet high ; and nearly 3 miles north-westward of Beloe, is a hill 454 feet high.

Meddang Islands are three islets lying about 3 miles off the entrance of the Mundo river, and forming the south-western extreme of Mundo bay, being joined to the main land by the mud flat. The largest islet is 147 feet high, and bears North 9 miles from the West Nangka. A small island named Pulo Antu, lies about $1\frac{1}{2}$ miles north-eastward of the Meddang islands.

Pulo Sambayang is an islet 175 feet high, lying about E. $\frac{1}{2}$ S. nearly 3 miles from Tanjong Ressam, and $1\frac{1}{4}$ miles W.S.W. of the entrance to the Tempelang river.

Karang Sarabu are a cluster of rocks some above and others below water, extending in a S. by E. $\frac{1}{2}$ E. direction nearly 2 miles from the point with a hummock on it between Tanjong Tadah and Tanjong Sukal.

MONOPIN HILL, or Gunong Manombing, in lat. $2^{\circ} 13' S.$, long. $105^{\circ} 12' E.$,* rises near the west end of Banka, and its summit being 1,456 feet high, may be seen at a considerable distance, and serves as a guide in approaching to or departing from the north end of Banka strait. It frequently happens at the north entrance of the strait, that this hill is the only visible object, especially when a vessel is near Sumatra in 5 or 6 fathoms water.†

SHORE MUD BANK.—The edge of the bank (page 72), after passing a cable's length outside the rocks off Tanjong Tedong, takes a N.N.W. direction, till abreast of the Meddang islands, outside of which it extends nearly a mile. From thence it curves round Mundo bay, projecting 4 miles to the southward of Tanjong Jurong-patt ; it then runs

* Stanton.

† Java Guide,

to the westward, passing Tanjong Ressam at $4\frac{1}{2}$ miles, and Tanjong Tadah at nearly 3 miles.

Mundo peak, well open to the southward of the Meddang islands, leads clear of the edge of this bank between those islands and Tanjong Tadah.

From Tanjong Tadah the bank still follows a westerly direction till South of Tanjong Puni, when it trends away sharply to the north-westward, following the curve of the coast line at an average distance of about $1\frac{1}{4}$ miles until abreast the east point of Mintok bay, from which it is distant only half a mile.

Between Tanjong Tedong and Tanjong Tadah, the soundings decrease regularly towards the bank, which may there be approached to 5 or even 4 fathoms, except near the Meddang islands, where a vessel should not shoal under 5 fathoms. At Tanjong Tadah the bank begins to get steeper to, and abreast of the Karang Sarabu rocks, there are 9 and 10 fathoms pretty close to its edge.

Caution.—The bank south of Puni point is very shallow and steep-to, having from 11 to 16 fathoms, almost close to its edge. Tanjong Tadah bearing E. by N. $\frac{3}{4}$ N. just clears this dangerous spit to the eastward, and Monopin hill N.W. by N., just clears it to the westward.

KARANG BROM-BROM is an extensive shoal of rocks and sand, dry in some places at low water, lying $4\frac{1}{2}$ miles South from the shore between Tanjongs Puni and Sukal. It is a little more than 2 miles long in a W. $\frac{1}{2}$ N. and opposite direction, and nearly half a mile wide at its western end, where the rocks are, and from which Monopin hill bears N.W. $\frac{1}{2}$ N.; the eastern end tapers away to a sandy point. This danger was marked by a temporary beacon, which is said to have disappeared.

The highest part of the hummock on the point behind the Karang Sarabu rocks bearing N. $\frac{1}{4}$ E.; or the highest part of Tanjong Tadah bearing N.E. $\frac{3}{4}$ N., clears the eastern end more than half a mile; and Bukit Beloe, bearing N. $\frac{3}{4}$ W., clears the western end nearly a mile.

A Channel 2 miles wide, having 7 to 15 fathoms water in it, lies between the Brom-Brom and the shore bank.

With reference to this channel, the Java Guide observes: "Notwithstanding that the channel between the Brom-Brom reef and Banka is only 2 miles wide, a vessel may easily work through it by day, during the western monsoon, because she can take advantage of the tides; but on the coast of Sumatra, a strong easterly current runs with little interruption; she must, however, be very careful in crossing over to the coast of Banka, as the bank is very steep, and she might suddenly fall from 7 to 3 fathoms before there would be time for a second cast of the lead."

AMELIA BANK is a small patch of hard ground, with $2\frac{1}{2}$ fathoms

water over it, at the south-east extreme of the Mintok bank, to the shoal patches of which it is connected by a ridge of 4 and 5 fathoms water. From it the western extreme of the Brom-Brom bears East $4\frac{1}{2}$ miles, and Monopin hill N. by W. $\frac{3}{4}$ W., 12 miles.

Bukit Beloe bearing N. $\frac{1}{2}$ E., leads a mile to the eastward of the Amelia bank; and the same hill N. by E. $\frac{1}{2}$ E., leads the same distance to the westward. The temporary beacon on the Brom-Brom, or the dry rocks of the reef, bearing E. by N. $\frac{1}{4}$ N., clears the south side of the bank, which should not be approached under a depth of 10 fathoms.

MINTOK BANK extends from the Amelia bank in a direction nearly parallel to the shore, for a distance of 10 or 11 miles, to within about a third of a mile of the Karang Hadji reef, off Kalian point. It is composed of hard sand, and has several patches with only $2\frac{1}{2}$ and 3 fathoms water over them, and 4 or 5 fathoms between.

A 2-fathoms patch lies N.W. by N. $2\frac{1}{2}$ miles from the Amelia bank: Bukit Beloe, bearing N. by E. $\frac{1}{2}$ E., which clears the Amelia bank to the westward, also clears this patch to the eastward.

From this last mentioned patch, other patches of $2\frac{1}{2}$ and 3 fathoms extend N.W. by W. for 5 miles, this part of the bank being about $1\frac{1}{2}$ miles wide. For $2\frac{3}{4}$ miles farther in the same direction the bank has from $4\frac{1}{2}$ to 7 fathoms water over it, the deepest water appearing to be with Mintok fort flagstaff in line with the pier head, bearing about N. by E. $\frac{1}{2}$ E.

Another 3-fathoms patch lies with the light-house on Kalian point bearing N. $\frac{1}{2}$ E., $1\frac{1}{2}$ miles; from which 5 fathoms may be carried towards the Karang Hadji reef until very close to it, when the water will suddenly deepen to 11, 17, or 20 fathoms. Monopin hill in line with the lighthouse on Kalian point, N.E. $\frac{1}{2}$ N., leads westward of the 3-fathoms patch, between it and the Karang Hadji reef.

A ship working through the strait, to keep clear of Mintok bank, should take care not to bring the lighthouse on Kalian point to the westward of N.W. by N.

KARANG HADJI is a dangerous reef of rocks and sand lying close to the north-west end of the Mintok bank; the rocks on it are all covered at high water, but many of them are visible at half tide. The reef is $1\frac{1}{2}$ miles long N.W. by W. and S.E. by E., and half a mile broad, and from its western and outer extreme, Kalian lighthouse bears E. $\frac{3}{4}$ N. $2\frac{1}{4}$ miles, and Tanjong Oelar and Tanjong Bersiap are in line; its eastern extreme bears S.W. by W. $\frac{1}{4}$ W. $1\frac{1}{2}$ miles from Kalian point. Close to it on the north, west, and south sides, the depths are irregular from 16 to 21 fathoms. A temporary beacon was placed near the eastern extremity of this reef in 1869, but it is probably long since washed away.

Tanjong Oelar kept well open of Tanjong Bersiap clears the west end of this reef; the highest part of Monopin hill in line with the lighthouse, clears its eastern extreme; and Tangong Puni bearing E. $\frac{3}{4}$ S., clears it to the southward.

RINNEB BANK, of hard sand, with $2\frac{1}{2}$ fathoms water on it, and 7 or 8 fathoms close to, extends East $1\frac{1}{4}$ miles from Kalian point, when it turns to the north-west for about half a mile, thus forming a spit projecting to the eastward; from thence it curves away and is lost in the sand-bank which extends half a mile from the shore of Mintok.

Two-thirds of a mile E. by S. from this spit is a 3-fathoms patch, from which Mintok pier head bears N.N.W. $\frac{3}{4}$ W., distant two-thirds of a mile, and Kalian point lighthouse West-northerly.

KALIAN POINT and LIGHT.—Kalian point, low and sandy, with some trees behind it, is the south-western extreme of the west end of Banka. The lighthouse upon it, in lat. $2^{\circ} 4' 37''$ S., long. $105^{\circ} 8' 23''$ E.,* is a white stone tower with a red lantern, which shows, at an elevation of 170 feet, a *fixed* white light, visible in clear weather at 20 miles.

About three-quarters of a mile north-west from the lighthouse is Tanjong Batu-brani, the trees immediately behind which are 127 feet high.

KALIAN LEDGE is a small reef, with only 6 to 9 feet water over it, lying a little more than a mile to the north-west of Kalian point; from it the lighthouse bears S.E. by E., Bersiap point N. $\frac{1}{4}$ W., and Monopin hill N.E. $\frac{1}{4}$ E.

KALIAN PASS, formed by Kalian point and ledge on one side, and the Karang Hadji reef on the other, is three-quarters of a mile wide, with soundings in it of 25 to 32 fathoms. This channel is generally used by vessels coming from the northward and proceeding to Mintok bay, and with a fair wind is preferable to the passage outside the Karang Hadji; but the great depth, bad anchorage, and strong currents, render it unadvisable to attempt to beat through.

In using this channel the sandy point upon which the lighthouse stands may be passed pretty close to; and the lighthouse on the bearing of E. by S., leads through between the Kalian ledge and the Karang Hadji reef.

MINTOK TOWN and ROAD.—Two miles E.N.E. from Kalian point on the banks of a small river is the town of Mintok, the capital of the island, having a fort upon a hill, and some stone houses close to the shore, the red roofs of which are visible at a considerable distance. The resident, and other Dutch officers have houses on the hill near the fort, most of the

* Stanton.

native houses being lower down nearer the sea. The mail steamers which run twice a month between Batavia and Singapore, always call here.

A pier nearly half a mile long, and running out to the edge of the bank, has been lately built, and is of great advantage to the trade of the place; on the extremity of the pier a small *fixed* white light is shown all night.

The best anchorage for large ships is in 10 to 6 fathoms, about $1\frac{1}{2}$ miles from the shore, with Monopin hill bearing about N. $\frac{3}{4}$ E., and Kalian point about W.N.W. or W. by N. The ordinary anchorage of the Dutch man-of-war stationed in Banka strait, and of the merchant vessels trading to Mintok, which are usually of a small class, is in $4\frac{1}{2}$ or 5 fathoms inside the 3-fathoms patch lying off the spit which extends from the Binnen bank, at any convenient distance and direction from the pier head.

DIRECTIONS.—The usual route to Mintok road is across the Mintok bank, between the Karang Hadji reef and the Amelia bank. A vessel coming from the northward and bound for the road, may proceed either through the Kalian pass (page 78), or she may pass outside the Karang Hadji reef and then follow the usual track across the Mintok bank. A good mark for crossing the bank is Monopin hill in line with the flagstaff on the fort bearing N. by E. $\frac{1}{2}$ E., which will lead over it in 5 or 6 fathoms water; another good mark is Monopin hill in line with the lighthouse N.E. $\frac{1}{2}$ N. No ship can cross the bank in safety with Monopin hill bearing to the westward of North; with the hill bearing North, a ship crossing the bank would have 3 fathoms at low water spring tides, the bottom hard sand, coral, and shells. When over the bank, the water will deepen to 18 or 20 fathoms, soft muddy bottom, and shoal again quickly towards the inner bank and the shore.

With a working wind keep Monopin hill between N. $\frac{1}{2}$ E. and N.N.E.

To enter Mintok road from the eastward, a vessel must work between the shore and the Mintok bank, being careful not to bring Tanjong Tadah to the eastward of E. by N. $\frac{3}{4}$ N., until Monopin hill bears N.W. by N.

A hard sandy bottom and shoal water will show when near the edge of the Mintok bank; while, to avoid the shallow along the coast, Monopin hill must not be brought more to the westward than N.W. by N., and taking care not to shoal to less than 5 fathoms.

TIDES.—At Kalian point it is high water, full and change, in the N.W. monsoon, at 8 h. 17 m. a.m., and in the S.E. monsoon at 8 p.m.; the springs rise $12\frac{1}{2}$ feet.

TANJONG BERSIAP, 168 feet high, bears from Tanjong Batu-brani, the north-western extreme of Kalian point, N. by W. $\frac{1}{3}$ W., distant $3\frac{1}{2}$ miles. The coast between curves slightly inland, and is fronted by a

bank extending nearly a mile from it, pretty close to which are 7 and 10 fathoms. Inside the edge of this bank, and lying some distance off Bersiap point, is a cluster of rocks, some of which are above and others below water.

Bersiap Hill, 336 feet high, is small, and stands by itself, about $1\frac{1}{2}$ miles north-east of the point. At 2 miles north-east of the hill, the extreme of a range running from Monopin to the north-west forms a conspicuous peak 709 feet high.

TANJONG OELAR, 156 feet high, is about 4 miles N. by E. from Tanjong Bersiap, the coast between forming a bay about a mile deep, in which are two or three points with small bays between them; nearly in the centre of it is a remarkable yellow cliff.

Water.—About three-quarters of a mile northward of the yellow cliff, and just to the south of a point with a rock off it, is a stream of water.

OELAR REEFS is the name given to the rocky and uneven ground, with reefs and rocks above water in places, extending off shore between Bersiap and Oelar points. From a mile off Bersiap point, it runs in a N. by W. direction for nearly 3 miles, when it trends away to the north-eastward, passing about three-quarters of a mile outside Oelar point, immediately off which are several rocks above water.

Transit Rock, on which H.M.S. *Transit* was wrecked, 10th July 1857, lies at the western extremity of this rocky uneven ground, at $2\frac{1}{4}$ miles off shore, and W. $\frac{1}{4}$ N. 8 cables' lengths from a reef which generally shows, except at high tides, with 6 and 10 fathoms between them. The least depth on the rock at low water springs is 12 feet, and from this spot Oelar point bears N.E. by E.; the highest point of Monopin range E. by S. $\frac{3}{4}$ S.; and Kalian point is $1\frac{3}{4}^{\circ}$ open of Bersiap point S.S.E.-southerly, distant from the latter point $2\frac{1}{4}$ miles. There are 20 fathoms water at a cable's length to the westward of the 12 feet; the depths around varying from 14 to 12, 7, and 5 fathoms over very uneven bottom.

A rock awash, at low water springs, lies E. $\frac{1}{2}$ N. 2 cables' lengths from the Transit rock; and there are $4\frac{1}{2}$ fathoms (perhaps less) rocky bottom, at half a mile to the northward of the Transit, with 20 fathoms close to; the locality of the latter is indicated by strong ripples.

Tanjong Batu-brani well open of Tanjong Bersiap, bearing S.S.E. $\frac{1}{2}$ E., clears the Transit rock to the westward; and Tanjong Biat, well open of Tanjong Oelar, bearing E.N.E., clears it to the northward.

TANJONG BIAT bears N.E. $\frac{2}{3}$ E. distant 3 miles from Tanjong Oelar, and, like that point and Tanjong Bersiap, has rocks above and below water, extending some distance off it.

The line of danger which extends about three-quarters of a mile off

Tanjong Oelar, follows the curve of the coast line at about the same distance towards Biat point, where it projects rather farther off.

Water.—In the bay between Oelar and Biat points is a small stream of water, with a village close to it.

ROCKY PATCHES, with 20 fathoms close to them, lie off Tanjong Biat, having a narrow channel with 10 and 11 fathoms water in it between them and the rocky ground extending from the coast. From the outer patch of 3 fathoms, Tanjong Oelar bears S. $\frac{1}{2}$ W. 3 miles, and Tanjong Biat S.E. by E., a little over 2 miles.

Tanjong Oelar bearing South, leads nearly half a mile westward of these dangers; and Bukit Batoe, a hill 708 feet high, about 12 miles eastward of Tanjong Biat, bearing E. by S., leads northward of them.

CAUTION.—The west coast of Banka, between Tanjong Kalian and Tanjong Biat, is very dangerous to approach, owing to the rocky patches just described and the deep water close to them; ships should therefore exercise great caution when in this vicinity, observing that Tanjong Bersiap, if not brought to the westward of South, will clear all the dangers between Tanjongs Oelar and Biat; and they should be careful to regard the marks given to clear the Transit rock.

FREDERICK HENDRICK ROCKS lie at the northern entrance of Banka strait, nearly midway between Batakarang point on the Sumatra coast and Tanjong Oelar on the Banka coast. They consist of two rocky patches, lying north and south of each other, having only 9 feet on the northern patch, and 3 feet on the southern. The two patches occupy a space about a mile long, north and south, and half a mile broad.

From the 3-foot patch Monopin hill bears nearly E. by S. 14 miles; and the lighthouse on Kalian point S.E. by E. $\frac{1}{2}$ E. $12\frac{3}{4}$ miles.

Monopin hill E. $\frac{3}{4}$ S., leads about half a mile southward of the 3-foot patch; and Monopin hill in line with the remarkable yellow cliff between Bersiap and Oelar points, E. by S. $\frac{3}{4}$ S., leads 2 miles northward of the northern patch.

Close around the shoal are 16 to 20 fathoms water.

Buoy.—A red buoy, surmounted with a staff, and the letters F.H. on a vane, is moored in 13 fathoms water at $3\frac{1}{2}$ cables' lengths south-west of this shoal, and is visible about 3 miles off. From it Batakarang point bears W. by S., Monopin hill E. by S., and Kalian point S.E. by E. $\frac{1}{2}$ E.; but as the buoy from the strong tides frequently shifts its position, vessels are cautioned not to place too much dependence on it.

Channels.—The channel westward of the Frederick Hendrick rocks is the one most generally used, the depths in it being moderate, decreasing regularly towards the bank extending from the Sumatra coast; whereas in

the channel eastward of the shoal, the water is much deeper and the depths irregular.

Between the shoal and the 3-fathoms line at the edge of the mud-bank extending from Batakarang point, the channel is $4\frac{1}{2}$ miles wide, having 16 and 17 fathoms close outside the 10-fathoms line towards the rocks; the depths under 10 fathoms decreasing regularly towards the bank.

The channel between the shoal and the Transit rock and reefs off the west coast of Banka is 8 miles wide, having 16 to 20 fathoms at 3 or 4 miles eastward of the shoal, and 19 to 25 nearer Banka, which depths increase to 24 and 30 fathoms close to the dangers extending from that coast.

Directions for West Channel.—To avoid the Frederick Hendrick rocks, vessels taking the channel between them and Sumatra should keep in $4\frac{1}{2}$ to 7 fathoms water on the edge of the bank off Batakarang point, and not keep more to the eastward than in 9 or 10 fathoms, while Monopin hill bears between East and E.S.E.

In working through this channel a vessel should not deepen to more than 9 fathoms towards the Hendrick rocks, but the bank off Batakarang point may be neared to 5 or $4\frac{1}{2}$ fathoms. When Monopin hill bears E.S.E. the vessel will be northward of the rocks.

In the East Channel Mounts Punyabung, Paree, and Jerankat, on the north-west part of Banka, will appear like islands (page 96). To pass eastward of the Frederick Hendrick, keep Mount Punyabung N.E., until Monopin hill bears E. $\frac{1}{2}$ S., when Punyabung must not be more eastward than N.E.; and when Monopin is E. by S. $\frac{1}{2}$ S., Punyabung must not be more north than N.E. $\frac{1}{4}$ N., so as to avoid in the first case the Hendrick rocks, and in the second the Transit rock. When Monopin bears southward of S.E., Mount Punyabung must not be brought to the northward of N.E.—see also page 92.

SOUNDINGS in BANKA STRAIT.—The soundings in the Stanton and Lucipara channels are given in pages 83 and 89. In Banka strait between Lalarie and Second points the depths are from 17 to 25 fathoms, shoaling suddenly from those depths to 10 fathoms on the Banka side of the strait, but decreasing regularly towards the 10-fathoms line on the Sumatra side.

In the middle of the strait, close to the northward of the rocky banks lying north-westward of the Timbaga rocks, are irregular soundings from 18 to 26 fathoms; and from thence towards the Nangka islands the depths are 15 to 19 fathoms.

An irregular shaped bank, 6 miles long, N.W. and S.E., and but three-quarters of a mile broad, with 9 and 10 fathoms water over it, lies nearly in the middle of the strait; from its south-east end the summit of the

Great Nangka bears N. $\frac{1}{2}$ W., distant $6\frac{3}{4}$ miles, and from its north-west end the summit bears N.E. $\frac{1}{4}$ E., 5 miles. Close to this bank on all sides are 12 to 14 fathoms, except on the western edge of the north-western extreme, where the depth is 19 fathoms.

A small patch of 9 fathoms, with 12 to 14 fathoms round it, lies about 2 miles south-eastward of the above-mentioned bank, about half a mile from the 10-fathoms line off the coast of Banka.

Westward of the Nangka islands, in the fairway of the strait, is an irregularly formed bank of coral, having 8 to 10 fathoms water over it, and 11 to 13 fathoms on both sides of it, which at the distance of a mile N.N.W. from the long 9-fathoms bank before described, forms a sort of elbow, with a narrow spit projecting about a mile from it, in the direction of the Middle Nangka island. Northward of the Nangka islands this bank merges into the bank extending from the coast, the 10-fathoms line bounding both, curving away from the parallel of West Nangka island to the north-westward, and rounding Third point at a distance of about 4 miles. Midway between the elbow and the 10-fathoms line off the Sumatra coast the depth is 18 fathoms, decreasing irregularly to 11 and 14 fathoms till abreast of Third point.

Between Third point and the two banks lying to the north-eastward of Fourth point, one of which has 5, and the other 6 fathoms water over it, the soundings vary from 9 to 14 fathoms; and from thence to the Frederick Hendrick rocks, the soundings are also very irregular, varying from 7 to 18 fathoms. This variation in the soundings is caused by several long narrow sand banks, the position and character of which will be much easier understood by reference to the chart which these directions are intended to accompany than by any description possible to be given here. Indeed, throughout the strait, the soundings cannot alone be relied upon to conduct a vessel safely through; but when associated with careful bearings and frequent references to the chart, a stranger need not run the least risk, or experience any difficulty in passing through the strait for the first time.

STANTON AND LUCIPARA CHANNELS.

The **STANTON CHANNEL**,* lying along the south-western coast of Banka, is 19 miles long, and nearly 3 miles wide at its narrowest part, with depths, mid-channel, increasing gradually from 7 fathoms at its south-eastern entrance to 20 fathoms near the other extreme. The approaches to it from the southward are marked by the well-defined mountain of St. Paul, and the conical hills of Gadong and Toboe Ali Lama (page

* See Chart of Banka Strait, South entrance, No. 2,808, scale, $m = 0.7$ of an inch.

67), and in fine clear weather by the more distant range of Padang, 2,217 feet high ; these cannot fail to point out the entrance, and the water being deep within half a mile of the Dapur islands (page 65), will give strangers confidence in steering for the land. Prominent points and hills will also be seen along the Banka coast, bearings of which will enable a vessel at any time to ascertain her position.

The channel is bounded by narrow banks extending in a N.W. by W. and S.E. by E. direction, and all partaking of the same formation (sând) in their shoalest parts, with a mixture of mud and sand between. The two marking the western boundary of the channel are named Smits and Melvill banks, after the late Lieutenants Smits and Melvill of the Dutch Royal Navy, whose valuable contributions to hydrography in the Java sea are so well known to seamen.

Smits Bank consists of four smaller banks, nearly connected, and forming one long narrow ridge 15 miles in length, with its shoalest part of 3 feet, lying 6 miles, and the next shoalest of 9 feet, 3 miles from the north-western end ; two other patches of 3 fathoms and $2\frac{3}{4}$ fathoms lie on the south-east-part of the bank.

Panjang hill, bearing N.E., leads to the north-eastward of this bank, between it and the Nemesis bank, in 6 fathoms at low water. Gadong peak in line with Toboe Ali point N.E. $\frac{1}{4}$ E., or Lucipara S.W., clears the south-eastern end in 4 fathoms ; and Lalarie point N.W. by W. $\frac{1}{4}$ W., or not approaching the bank to a less depth than 10 fathoms, clears the north-eastern side.

Melvill Bank, 5 miles long, and nearly half a mile broad, lies a quarter of a mile to the eastward of the south-eastern part of Smits bank, with a depth of 7 and 8 fathoms between. The shoalest part of this bank is near its north-western extremity, and is about 2 miles in length, with from 2 to 3 fathoms on it. At the north end, in 5 fathoms, Laboh point bears N.E. by E. ; and the bank is cleared to the south-eastward in 7 fathoms by the latter point bearing N. by E. $\frac{1}{2}$ E. ; and to the eastward in 8 fathoms, by not bringing Parmassang peak more open to the westward of Banka hill than N.W. $\frac{3}{4}$ N.

Between the above banks and Lucipara, there are many others all trending in the same direction, with narrow deep water channels between ; but as these channels are exceedingly narrow, and no marks can be given to clear the banks, they are not available for vessels.

Eastern Bank.—The bank bounding the eastern side of Stanton channel is 13 miles long and nearly a mile wide, at 3 miles S.W. by S. of Laboh point, which is the broadest and shoalest part. It is formed by three smaller banks nearly joined together, with from 2 to 3 fathoms on the north-western and south-eastern ones, and only $4\frac{1}{2}$ feet on the middle of the

centre bank. The north-western extremity is separated from a projecting horn, extending from the shore mud flat at 2 miles S.S.W. of Pulo Dahun, by a narrow channel of 6 fathoms.

Gadong peak, in line with Toboe Ali fort, bearing N.E. $\frac{1}{2}$ N., leads to the southward of the south-eastern part of the bank in $4\frac{1}{2}$ fathoms; Dapur island S.E. by E. $\frac{3}{4}$ E. leads to the westward; and the Mamelon or Hummock kept open to the westward of Pulo Besar, N.W., clears the west side of the north-western extremity of the above banks.

A small bank of sand lies one mile to the westward of the south-eastern extreme of the Eastern bank, but as not less than $4\frac{1}{2}$ fathoms were found on it at low water it is not dangerous to ships passing through.

Inner Channel.—To the eastward of the Eastern bank along the coast of Banka, there is an inner channel nearly a mile wide, with 4 to 6 fathoms water in it, but as it is encumbered with shoals it is only navigable for small vessels. Dapur island bearing S.E. by E. leads nearly in mid-channel.

There are also two outlets into the main channel over the Eastern bank, in 5 and 4 fathoms; the former with Pulo Dahun bearing N.N.E.; the latter and southern outlet, when Pulo Puni and Gossong point are in line, E. $\frac{1}{2}$ N.

Nemesis Bank, lying nearly mid-channel between Pudi point and False First point, is a long ridge of sand extending 9 miles in a N.W. by W. and S.E. by E. direction, with irregular soundings of from 3 to 10 fathoms on it. The shoalest part consists of two patches of 3 fathoms, each about 2 cables' lengths in extent, upon one of which the French frigate *Nemesis* grounded in 1857. They lie E.S.E. and W.N.W. from each other, distant half a mile, and from the western patch Lalarie point bears N.N.W. $\frac{3}{4}$ W. $4\frac{3}{4}$ miles, and False First point S.S.W. $\frac{3}{4}$ W. $4\frac{1}{4}$ miles.

Casuarina point kept open of Lalarie point bearing N. by W. $\frac{3}{4}$ W. leads to the westward of these shoal patches, in 14 fathoms water; the Mamelon or Hummock N. by E. $\frac{1}{4}$ E., or False First point S.W. $\frac{1}{2}$ S., leads to the eastward; and Lalarie point bearing N.W. $\frac{1}{2}$ N. clears them to the northward. There is another patch of 5 fathoms lying 2 miles from the south-eastern extreme of the bank, with False First point W. $\frac{1}{4}$ S., and First point S. by W. $\frac{1}{4}$ W., distant $3\frac{1}{4}$ miles.

ANCHORAGE may be found anywhere in the Stanton channel, but ships bringing up with their kedge or stream anchor must always be prepared to let go the bower anchor, as there will be experienced, particularly during the change of the monsoons, very dangerous squalls, with heavy rain, thunder, and lightning, which generally lasts for about an hour.

TIDES.—In the S.E. monsoon it is high water, full and change, at Toboe Ali point, on the Banka shore, at 8h. 30m. p.m., and at 10 a.m. in N.W.

monsoon. The ordinary rise at springs is $10\frac{1}{4}$ feet, but it sometimes reaches 12 feet. The highest tide generally occurs two days after full and change. The rate at springs is $2\frac{1}{2}$ knots. The flood stream sets to the N.W. and runs for about 12 hours, and the ebb the same period in the opposite direction, but they are both sometimes influenced by the strength of the monsoon. When it is blowing strong from the S.E. the flood stream often runs for 14 hours.

At Laboh point it is high water, full and change, at 11h. p.m. in the S.E. monsoon, and the rise at ordinary springs is 10 feet.

After rounding Lalarie point in the S.E. monsoon the flood sets N.N.W., and the ebb to the S.S.E., along the Banka shore.

The time of high water at Laboh point being $2\frac{1}{2}$ hours later than at Toboe Ali point, in the southern part of Stanton channel, for a few days after full and change the tides will be found, (as there is generally 12 hours flow and ebb,) to run in one direction all night, and the opposite direction during the day, with a velocity of from $2\frac{1}{2}$ to 3 knots. The current also setting directly mid-channel, the flood N.W. by W., and the ebb S.E. by E., vessels may take advantage of it in light airs to drop through.

DIRECTIONS for STANTON CHANNEL from the SOUTHWARD.—

Vessels from the southward intending to proceed into Banka strait by the Stanton channel cannot fail, in approaching the coast of Banka, to recognize the mountain of St. Paul (page 67) by its flattish top having several nipples of nearly the same elevation, and Gadong and Toboe Ali Lama peaks by their conical appearance. Should the weather be clear, the distant high range of Padang will be visible. The highest peak of this range is quoin-shaped, attaining from its western shoulder an elevation of 2,217 feet, with several lower hills of a rounder and more conical appearance adjoining, the two westernmost being about 1,200 and 1,400 feet high.

After recognizing Mount St. Paul and Toboe Ali Lama peak, approach the latter on a North bearing, and when about 3 miles to the southward of the Dapur islands steer N.W. by W., which will lead nearly mid-channel to abreast Banka point: recollecting the marks given at page 84, for clearing the Melvill and Eastern bank.

When off Laboh point, the high range of Parmassang will be visible, rising from a gradual slope on its western shoulder to a flat top peak, with two lower ones adjoining. The three hills, Banka, Panjang, and Woody, will also be seen; the two former may be known by their wedge shape and the latter by its isolated position.

From abreast Banka point a course may be shaped along the Banka shore, passing Lalarie point at a distance not within $1\frac{1}{2}$ miles, and from thence to Second point. When Pulo Dahun bears North, great care must be

taken to avoid the spit which extends in a south-easterly direction from the shore mud flat, between the above island and Banka point. The Mamelon or Hummock, N.W., well open to the westward of Pulo Besar, clears this spit (page 85); from thence to the Timbaga rocks the bank may be avoided by not shoaling towards it under a depth of 10 fathoms.

Working through this channel from the eastward, vessels may stand towards the south extreme of the Dapur islands to a distance of half a mile, as these islands have deep water at 4 cables' lengths from them. Between this and Toboe Ali the shore mud flat may be approached until Pulo Dapur bears S.E. by E. $\frac{1}{2}$ E., and Lucipara may be neared to a distance of 5 miles; but when Gadong peak bears N.E. $\frac{1}{2}$ N., or comes in line with Toboe Ali fort, Pulo Dapur must not be brought to the southward of S.E. by E. $\frac{3}{4}$ E. to clear the south-eastern part of the Eastern bank.

Avoiding to bring Parmassang peak more open to the westward of Banka hill than to bear N.W. $\frac{3}{4}$ N., will clear the Melvill bank, and when Laboh point bears N.E. $\frac{1}{2}$ N., by not shoaling under 10 fathoms, all the banks on both sides will be cleared. Lalarie point N.W. by W. $\frac{1}{4}$ W. will also clear the north-eastern part of Smits bank.

The shoal patches on the Nemesis bank should not be approached under a depth of 10 fathoms until Casuarina point comes open of Lalarie point, and in rounding the latter point take care not to come into a less depth than 10 fathoms, as the bank is here steep-to. The Timbaga rocks may also be avoided by following the same precaution, and from thence it is recommended to work up from Second point along the Sumatra coast.

FROM the WESTWARD.—Proceeding through Stanton channel from the westward, when abreast and $1\frac{1}{2}$ miles distant from Lalarie point, an E.S.E. course will lead nearly mid-channel between the Nemesis bank and the bank extending from the Banka shore, but when Panjang hill bears N.E. a more southerly course must be shaped to pass in mid-channel. When Dahun point bears North, the Mamelon or Hummock open of Pulo Besar N.W. (the clearing mark for the spit off Pulo Dahun, page 85), also leads directly through the channel.

Working through from the westward in the S.E. monsoon, the same precaution must be taken as already mentioned to avoid the shoalest part of the Nemesis bank, which will be passed when the Mamelon bears N. by E. $\frac{1}{4}$ E.; and should a strong flood tide be then running it would be advisable to anchor in 8 or 9 fathoms, sand, on the Nemesis bank, as the water on both sides of it is deep, and wait for a change of tide, or the chance of the land breeze, which blows generally either during the night or early in the morning from the Banka shore.

When Panjang hill bears N.E., Lalarie point must not be brought to the northward of N.W. by W. $\frac{1}{4}$ W. to avoid Smits bank, and the same directions as already given in not approaching the banks under 10 fathoms until Laboh point bears N.E. $\frac{1}{2}$ N. (page 87), will be quite sufficient to enable any vessel to work through.

LUCIPARA CHANNEL.—The south entrance to this channel is between Lucipara island and Lucipara point, nearly West, 9 miles distant from it. The western side of the channel (page 57) is bounded by the mud flat which projects from the coast of Sumatra for 2 miles and more, and its eastern side, by various hard and dangerous sand-banks, which narrow the breadth of the passage to $1\frac{1}{2}$ and 2 miles.

Mr. Stanton is of opinion that this channel will, within a few years, become unnavigable for vessels of large draught, owing to the rapid extension of the mud flat projecting from the Sumatra coast on the western side, and to the extension, also, of the sand-banks on the eastern side.

Round Shoal.—The southern sand-bank in this channel is nearly 2 miles long W.N.W. and E.S.E., and about a mile broad, the least water, $1\frac{1}{2}$ fathoms, being near the middle of it. From its southern edge in 3 fathoms the summit of Lucipara island bears S.E. $\frac{1}{3}$ E. $7\frac{1}{4}$ miles, and from the western edge S.E. $\frac{1}{2}$ E. 9 miles; and, bearing S.E. by E., leads nearly three-quarters of a mile westward of it.

The narrowest part of the Lucipara channel is between the western extreme of this bank, which forms a kind of elbow, and the mud flat extending from the Sumatra coast.

Buoy.—A white conical buoy, surmounted by a ball, was placed in 3 fathoms, at $3\frac{1}{2}$ cables' lengths north-westward of the north-west end of Round shoal, on the eastern side of the Lucipara channel. From it First point bore N.N.W. $8\frac{1}{2}$ miles, and Lucipara island S.E. $\frac{1}{2}$ E. 9 miles. No dependence, however, can be placed on its remaining long in one position, owing to the strong tides and many floating trees. In 1860 the buoy was picked up off Mintok, and in the calm weather at the change of the monsoon it was replaced in its former position.

Hindustan Bank extends from close to the eastern edge of the Round shoal N.N.W. $\frac{1}{2}$ W. about $3\frac{1}{2}$ miles. The depths on the southern and middle parts of it are 1 to 3 fathoms, but about three-quarters of a mile from its northern extreme is a patch of hard sand with only 3 feet water over it. From the western edge of the bank, which is distant nearly a mile S. by W. from its northern extreme, Green point bears W.N.W. 3 miles, and First point N.W. by N. 6 miles.

Merapie Shoal, the most northern of the banks on the eastern side of the Lucipara channel, is composed, like the others, of hard sand, and is three-quarters of a mile in extent north and south, and more than

half a mile broad. The least water on it is $2\frac{1}{4}$ fathoms, and from its western edge First point bears W. by N. $\frac{3}{4}$ N. nearly $2\frac{3}{4}$ miles, and Green point S.S.W. $\frac{3}{4}$ W. $3\frac{3}{4}$ miles. From the middle of the shoal, False First point is in line with First point.

Soundings.—A few miles southward of the entrance of the Lucipara channel the depths are from $4\frac{1}{2}$ to 5 fathoms, deepening to the south-eastward of Lucipara. In mid-channel at the entrance are from 5 to 6 fathoms, deepening a little towards the island, but shoaling gradually towards the Sumatra flat. About the same water will be carried as far as the buoy off the north-west end of the Southern bank, when the soundings begin to deepen to 7 fathoms, and a little farther on to 8 fathoms. Between the Merapie shoal and the Sumatra flat are from 9 to 12 fathoms, deepening to 14 or 16 fathoms towards First point, but shoaling to 8 or 10 fathoms more to the eastward, about 2 miles distant from the point.

In the Lucipara channel the bottom is generally hard sand on the banks towards the eastern side, and soft mud on the western or Sumatra side; yet close to the north-western edge of the Middle sand-bank, the bottom is also soft, with $5\frac{1}{2}$ and 6 fathoms; it is therefore advisable not to keep in too hard, or in too soft bottom, but in the middle of the channel.*

DIRECTIONS for LUCIPARA CHANNEL from the SOUTHWARD.—

When bound towards Banka strait from the southward, the island of Lucipara is generally made between the bearings of N. by E. and N.W., and in $5\frac{1}{2}$ to 8 or 9 fathoms; but should it, when first seen, have a more westerly bearing, run to the westward till it bears North 4 or 5 miles: and then, by steering N.W., the vessel will pass between it and Lucipara point. With westerly winds it is advisable to keep on the western side of the channel in $4\frac{3}{4}$ to $5\frac{1}{2}$ fathoms. The depth towards Lucipara increases to 6 and 7 fathoms when the island bears between E.N.E. and S.E. by E., and between those bearings it may be approached as near as $1\frac{1}{2}$ miles.

In clear weather, when the Parmassang range is visible, the highest peak on the western extreme of the range in line with First point, N. by W. $\frac{1}{2}$ W., will lead into the Lucipara channel, not quite three-quarters of a mile outside the 3-fathoms edge of the mud-bank projecting from Lucipara point. Formerly this mark led through the middle of the channel, but owing to the mud bank having become of late years considerably more extended, it no longer answers that purpose. Therefore this mark should be left when Lucipara island bears about E.S.E. or S.E. by E.; then, by keeping the Mamelon Hummock (page 69) on a N. $\frac{3}{4}$ W. bearing, it will lead through between the bank off First point and the Merapie shoal, until Lalarie point is seen well open of First point, when a vessel may begin to edge away to the westward to round First point,

* Java Guide.

taking care not to approach it nearer than a mile, as the bank projecting from the point is steep-to, especially on its north-east side. After rounding First point at not less than that distance, a N.W. $\frac{1}{2}$ W. course will lead midway between False First point and the Nemesis bank.

A vessel entering this channel with Parmassang peak in line with First point, N. by W. $\frac{1}{2}$ W., will have about 4 fathoms at low water, with an occasional cast of $4\frac{1}{2}$ or $4\frac{3}{4}$ fathoms perhaps, until Lucipara island bears E. by S. $\frac{1}{2}$ S., when the soundings will deepen to $4\frac{3}{4}$ and 5 fathoms, and shortly afterwards to $5\frac{1}{2}$ and 6 fathoms, till abreast the buoy off the Round shoal; from thence 6, 7, and 8 fathoms will be carried until nearly abreast the Merapie, when the water will suddenly deepen to 11 or 12 fathoms. If, from the haziness of the weather, Parmassang peak cannot be seen, keep midway between Lucipara island and the coast, taking care not to bring the island to bear S.E. $\frac{3}{4}$ E., before First point bears N. by W. $\frac{1}{2}$ W., or the Mamelon Hummock N. $\frac{3}{4}$ W.

From the NORTHWARD.—Entering Lucipara channel from the northward, First point must be rounded with great caution, on account of its being steep-to, especially on its north-eastern side, and it must not be approached nearer than a mile; at the same time, if the tide is running to the south-eastward, it will be necessary to use proper care that, in giving a safe berth to First point, the vessel is not set too near the Merapie shoal, which the tide will be likely to do unless guarded against. When Mamelon Hummock bears N. $\frac{3}{4}$ W. keep it so, until Lucipara is S.E. by E., or E.S.E., when Parmassang peak may be brought in line with First point, N. by W. $\frac{1}{2}$ W., which will lead clear of the Sumatra bank; or a S.E. by S. course may be steered, which will lead midway between Lucipara and the main.

Working through this channel a vessel may stand towards the Sumatra bank safely by attending carefully to the lead; remembering not to go into less than $6\frac{1}{2}$ fathoms when near the elbow projecting just to the southward of Green point. Lucipara must not be approached nearer than 2 miles, when bearing to the northward of N.E. by E.; between the bearings of N.E. by E. and E. by S. it may be approached to a mile.

Careful attention to the lead and a good look out, will also give sufficient warning when standing towards the banks on the eastern side.

CAUTION.—Many vessels passing through the Lucipara channel have grounded on the mud flat extending from the coast of Sumatra, especially a short distance to the southward of Green point, where the flat extends farther out, and all have been obliged, before they could get off, either to trans-ship or to throw a part of the cargo overboard, as the anchors which were laid out on the soft muddy bottom to heave them off came home. This part of the flat shoals suddenly from 6 to 3 fathoms, and therefore should never be approached to a less depth than $6\frac{1}{2}$ fathoms.

It will also be necessary to use great caution when working through this channel from the southward and standing to the eastward, to avoid being set on the banks by the tides, which sweep over them with great strength, and will soon carry a vessel into danger, if not on her guard. This is very likely to happen when to the southward of the Round shoal, and standing to the eastward. A vessel should never be tempted to rely too confidently on seeing the buoy off the north-west end of that shoal, for it is frequently difficult to make out until it is close to; Lucipara, bearing S.E. by E., must be relied upon as the only safe guide to keep clear of the Round shoal.

In working through this channel from the northward similar caution is required. With light winds it is very difficult to get into the northern entrance, the tides sweeping vessels away to the south-eastward amongst the banks.

DIRECTIONS from LALARIE POINT through BANKA STRAIT.—

Having passed through either Stanton or Lucipara channels, and brought Lalarie point to bear about East, distant 3 miles, a N.N.W. $\frac{3}{4}$ W. course for about 10 miles will lead midway between the rocky bank of 7 or 8 fathoms water, lying north-westward of the Timbaga rocks, and the mud-bank projecting from Second point, and in this track the soundings will be from 20 to 22 fathoms water, with an occasional cast 2 or 3 fathoms deeper. Continuing the same course for 6 or 7 miles farther, the water will have shoaled gradually to 10 or perhaps 6 fathoms, and the vessel will then be $1\frac{1}{2}$ to $1\frac{3}{4}$ miles outside the horn or spit projecting from the Sumatra flat (page 58). Still continuing the same course for another 5 or 6 miles in from 6 to 10 fathoms, the soundings will soon deepen to 11 and 14 fathoms; 13 or 14 fathoms will then be carried for 8 or 9 miles farther, when Third point will bear S.W., distant about 2 miles.

If a vessel following this track, after having passed Second point, should shoal the soundings under 6 fathoms, she will be getting too near the Sumatra flat, and should haul out more to the eastward; remembering that Second point must not be brought eastward of S. by E. $\frac{3}{4}$ E. until Parmassang peak bears E.S.E., to clear the spit or horn projecting from the bank.

From the above position off Third point, a W. by N. $\frac{1}{4}$ N. course may be steered for about 28 or 29 miles, which, if the vessel be not affected by tides or currents, will place her in a position from which Fourth point will bear about S.E. $\frac{3}{4}$ S., distant 7 miles, and Monopin hill N. $\frac{1}{4}$ E. to N. $\frac{1}{2}$ E.

In this track a vessel will have soundings varying from 12 to 9 fathoms, and occasionally a cast of 13 or 14 fathoms, perhaps, for about 21 miles, when she will be near the position of the 5 and 6 fathoms banks lying north-eastward of Fourth point (page 60). If a straight course has been

steered she will pass between those banks in 13 or 14 fathoms, probably getting one or two casts of 8 fathoms. When the beacon on Fourth point is abeam, it should be distant $4\frac{1}{2}$ miles, and from 12 to 15 fathoms will then be carried until Fourth point bears S.E. $\frac{3}{4}$ S. distant 7 miles.

From thence steer about N.W. by W. for Batakarang point,—paying particular attention to the tides, which frequently set strong into or out of the Palembang rivers (page 56),—and the vessel will soon pass over a narrow bank of sand, having 7 fathoms on it, and then again deepen the water to 13 and 16 fathoms. Having run 15 or 16 miles, the soundings will again decrease under 10 fathoms, and she will be on the edge of the bank extending from Batakarang point, and may proceed along the edge of it in from 8 to 6 fathoms; the directions given at page 82 must then be followed to pass westward of the Frederick Hendrick rocks, which channel is recommended as being the best and safest, especially at night.

If, however, from a position about 7 miles N.W. $\frac{3}{4}$ N. from Fourth point, it is determined to proceed through the channel between the Frederick Hendrick rocks and the Transit rock, steer N.W. by W. for 7 or 8 miles, until Monopin bears about N.E. by N. or N.E. $\frac{1}{2}$ N., when a N. $\frac{3}{4}$ W. or N. by W. course will lead about midway between those dangers, but their clearing marks, given at pages 80 and 82, must be carefully attended to. In this track 14 to 17 fathoms will be carried until abreast of the Karang Hajdi reef, when the soundings will deepen to 24 and 27 fathoms, if the vessel is 3 miles westward of the reef, but if distant 4 miles or more from it, they will be but from 15 to 18 fathoms.

When steering a N. $\frac{3}{4}$ W. or N. by W. course, if after having deepened the water to 24 or 27 fathoms, and brought the lighthouse about S.E. by E., a vessel should shoal suddenly to 17 or 16 fathoms, and immediately after deepen to 27 or 33 fathoms, she will have passed over a rocky patch which lies on that bearing from the lighthouse, distant 6 miles. Another rocky patch of only 12 fathoms over it lies N.N.W. $\frac{1}{2}$ W. $2\frac{1}{2}$ miles from the 16-fathoms patch, and N.W. $\frac{1}{4}$ W. 8 miles from the lighthouse; and a short distance to the north-east of it there is a patch of only 7 fathoms: these two latter patches are right in the fairway of the channel between the Frederick-Hendrick and Transit rocks.

DIRECTIONS through BANKA STRAIT from the NORTHWARD.

—A vessel having passed the Toedjoe or Seven islands, and steering to the southward for the entrance of Banka strait, will find no difficulty in clear weather in fixing her position, which can be readily done by cross bearings of Mount Punyabung or Saddle hill, and Monopin hill; under such circumstances the strait can be entered on either side of the Frederick Hendrick rocks by attending to the directions given at page 82. But in thick weather it often happens that no land can be seen until the

vessel has arrived very near to the entrance of the strait, and at such times it is important to get hold of the bank extending from the Sumatra coast, and then proceed along its edge in 8 to 6 fathoms, carefully attending to the lead. Sometimes Monopin will be seen but no other land, in such case it will be prudent to proceed as before, keeping along the edge of the bank.

With Monopin bearing S.E. $\frac{1}{2}$ E., a vessel will be about 8 miles, and with it bearing S.E. by E., about 6 miles to the northward of the Frederick Hendrick rocks, and can pass westward of them as before directed. When Monopin bears about East, she will be more than 2 miles to the southward of the shoal, and may steer S.E. $\frac{1}{2}$ S., for about 11 or 12 miles, till Monopin is in line with the lighthouse on Kalian point, N.E. $\frac{1}{2}$ N.; the course will then be S.E. by E. for 6 or 7 miles, or until Monopin is about N. $\frac{1}{2}$ E. or N. $\frac{1}{2}$ E., when the beacon on Fourth point should bear about S.E. $\frac{1}{2}$ S., or S.E. $\frac{3}{4}$ S., and be distant 6 or 7 miles. From this position, it will be only necessary to reverse the order of the directions given at page 91.

WORKING through BANKA STRAIT.—Directions have been already given in pages 87 and 90, for working into the strait from the southward, and in page 82 for working into it from the northward by the channels on either side of the Frederick Hendrick rocks; it may, however, be as well to remark again here that the passage westward of the Frederick Hendrick shoal is much to be preferred at night, or when the land is obscured and reliable bearings cannot be obtained. By tacking in 9 fathoms when standing towards the shoal, all round which are depths of 16 to 20 fathoms, and tacking in 5 or $4\frac{1}{2}$ fathoms when standing on towards bank, where the soundings decrease regularly, a ship will run no risk, nor experience any difficulty.

The bank fronting the Sumatra coast may be conveniently approached when well between the points, by common attention to the lead; but off the points and for a few miles on either side of them great attention must be paid to the soundings, and the bank approached with caution, and never under a depth of 10 fathoms, as the water shoals suddenly from that depth. The most dangerous part of the bank is from Fourth point for about 6 miles to the westward of it (page 60), which must be approached with the utmost caution.

Mr. Stanton strongly recommends vessels working in either direction through the strait, or proceeding through with a fair wind and contrary tide, to avoid the Sumatra coast and keep on the Banka shore, between Lalarie point and Tanjong Tadah. He observes that hitherto it has been the custom for all ships to work along the Sumatra coast, where they have not only a strong wind but a constant current to contend with, con-

sequently, sailing vessels have been delayed two or three weeks, and instances are known of vessels being a month making the passage through Banka strait, whereas a smart sailing vessel, by keeping on the Banka side, taking advantage of the tides and following the directions given below, may make the passage even in the full strength of the monsoon in three or four days.

The advantages gained by keeping on the Banka coast are as follows :—

A vessel may carry a fair tide all the way through by starting from either extremity at low water, as the tidal waves from the China and Java seas meet near the Nangka islands ; prominent hills and points, with a gradual decrease in the soundings give confidence to mariners when steering for the land ; a strong land wind will be generally experienced during the night, when the regular monsoon is blowing in the middle of the strait and near the Sumatra coast ; and in the strength of the monsoon regular tides will be met with on the Banka shore, while strong currents will invariably be found setting to leeward along the Sumatra shore.

From the Southward.—In working between Lalarie point and the Nangka islands the lead is a good guide, as the soundings decrease regularly, except near Lalarie point and the Timbaga rocks, where they decrease rather suddenly from a depth of 10 fathoms ; if, however, Lalarie point is not brought south of S.E. $\frac{1}{2}$ S. until Brani peak bears E. by N. $\frac{3}{4}$ N., a vessel will keep clear of all danger near the Timbaga rocks. Having arrived within 3 miles of the Great Nangka, the spit extending from the south end of that island should not be approached under a depth of 7 fathoms ; and to avoid the rocky ledges extending from Middle and West Nangka, West reef (6 feet above water, page 73,) should not be brought to the westward of North after the peak of Great Nangka bears N.E., until the vessel is to the northward of the Nangka group.

From the Nangka islands to Tanjong Tadah the shore may be safely approached by the lead, as the soundings are shoal with a gradual decrease. When Tanjong Tadah bears N.E. $\frac{3}{4}$ N., (which clears the eastern side of the Brom Brom reef,) vessels should cross over towards Fourth point on the Sumatra coast.

From the Northward.—Coming from the northward, it is merely necessary to reverse the order of the above directions. Vessels should keep towards the Sumatra coast until past Fourth point, which they should not approach nearer than 3 miles. When Tanjong Tadah bears N.E. $\frac{3}{4}$ N., they may cross over to the Banka side, taking care not to bring that point to the eastward of the above bearing. From Tanjong Tadah to the Nangka islands they may stand in-shore guided by the lead ; but having arrived abreast of the latter, take care not to bring West reef

to the westward of North, until the peak of Great Nangka island bears N.E., and not approach the spit off the south end of the island under 7 fathoms. From $2\frac{1}{2}$ miles south of the Nangka islands the shore may be approached by the lead to any convenient depth of water, but when Brani peak bears E. by N. $\frac{1}{2}$ N. the vessel will be nearing the Timbaga rocks, and must not then come under 10 fathoms. Lalarie point bearing S.E. $\frac{1}{2}$ S. clears all the dangers near the Timbaga rocks, and the point should not be brought to the southward of that bearing, until Casuarina point bears East. From thence to Lalarie point the shore may be again approached by the lead; but when nearing the point the soundings decrease more suddenly, and a vessel should not go into a less depth than 10 fathoms, and should round the point at the distance of about $1\frac{1}{2}$ miles. From thence she can proceed to the southward through either the Stanton or Lucipara channels, according to the directions given at pages 87 and 90.

NORTH-WEST AND NORTH COASTS OF BANKA.

BULU or JIBUSE BAY.—The north-west coast of Banka is 43 miles in extent, from Tanjong Oelar to Tanjong Mallallu, the bay of Bulu or Jibuse occupying more than half of that space. From Tanjong Biat (page 80), the south-western point of the bay, to Tanjong Ginting, its north-western point, the direction is about N.E. $\frac{3}{4}$ N., and the distance $17\frac{1}{2}$ miles; the depth of the bay is 7 miles.

The whole of this bay is shallow to a distance of 3 miles from the shore, except to the southward of Ginting point, where the shoals do not appear to extend farther than a quarter of a mile. The rivers Bulu and Jibuse disembogue in its north-east part. The bay is much visited by coasters, and occasionally by larger vessels for the purpose of loading tin.

The anchorage is in 5 or 6 fathoms on soft muddy bottom, with Ginting point N. by E. $\frac{1}{2}$ E., Songi Bulu E. $\frac{1}{2}$ S., and the watering place N.E. by E. $\frac{1}{2}$ E.; or in 5 fathoms off the Bulu river, with the village N.E. $\frac{1}{2}$ E., and Ginting point N. by W. $\frac{3}{4}$ W., 3 miles from the shore.

Water.—Fresh water can be obtained in a small bay about $1\frac{1}{2}$ miles to the eastward of Tanjong Ginting.*

TANJONG GINTING, the north-west point of Bulu bay, is a long low point, having a reef projecting 2 miles from it, close to which are 8 fathoms water. The position of the point may be easily recognized by the three hills, Paree, Punyabung, and Jerankat, which at a great

* Our supply of fresh water getting short, we anchored in $5\frac{1}{2}$ fathoms, mud, with Ginting point N. by E. $\frac{1}{4}$ E. about $1\frac{1}{2}$ miles, and Monopin peak S.S.W. 30 tons were obtained in 24 hours, but the water was very brackish, and much trouble was experienced in rafting the casks to the ship.—J. W. King, Master of H.M. Flag Ship *Vernon*, March 1847.

distance appear like islands. The first, 858 feet high, is the most southern one of the three, and rises 4 miles East of the point; Punyabung, a remarkable saddle-shaped hill, 794 feet high, very conspicuous from seaward, rises close to the coast, about 3 miles north-eastward of Ginting point; Jerankat, 657 feet high, is about 4 miles E.N.E. from Punyabung.

THE COAST between Ginting point and Punyabung hill forms a small bay, which appears to be nearly filled with rocks. It then continues to the north-eastward for 4 miles to Pulo Pamujah, an islet lying close to the coast, when it takes a direction a little more to the eastward for 5 miles to Tanjong Dugong, off which lies Pulo Prout, and several islets and rocks; from thence it trends E.N.E. about 9 miles to Tanjong Mallallu. The whole coast between Punyabung hill and Tanjong Mallallu is fronted by a reef which projects 1 or 2 miles from the shore.

MALAN HYU, MALAN DOYANG, and MALAN GUNTUR are three rocks lying off the coast between Tanjong Dugong and Tanjong Mallallu. Malan Hyu is about the size of a boat, and covered with white guano. It lies about 3 miles North from Tanjong Dugong, with Punyabung hill bearing S.W. by S., Mount Mallallu E. $\frac{1}{4}$ S., and Malan Doyang E. by N. $\frac{1}{2}$ N., distant nearly 4 miles.

Malan Doyang is not much above water, and only the size of Malan Hyu. It lies about 3 miles off shore, with Punyabung hill S.W. $\frac{1}{4}$ S., Tanjong Mallallu E. by S. $\frac{1}{4}$ S., and Malan Guntur E. by S. Sunken rocks are shown on the chart about midway between Malan Doyang and the shore in a S. by W. direction from the former.

Malan Guntur is nearly midway between Malan Doyang and Tanjong Mallallu, and about a mile off shore. It is larger than the other two rocks, and lies within the limit of the shoal water projecting from the coast.

All these rocks appear to be surrounded to a short distance by sunken rocks. Close to the northward of them the depths are very irregular, 17 to 27 fathoms; and 7 to 13 fathoms, rocky bottom, between them and the shore. By keeping 4 miles off Banka, all these dangers are avoided.

KLABAT BAY.—Tanjong Mallallu, in lat. $1^{\circ} 31\frac{1}{2}'$ S., long. $105^{\circ} 38\frac{1}{4}'$ E., is the western point of entrance of Klabat bay, and upon it is a pretty high hill, known as Mount Mallallu. Here the north-west coast of Banka terminates, as the coast line on the other side of entrance of Klabat bay trends to the eastward, and forms the north shore of the island.

Klabat bay runs up into Banka island about 27 miles in a south-east direction, but being encumbered with many rocks and shoals, there is only a narrow passage left, of 4 or 5 fathoms water, by which vessels of heavy burden proceed as far as the mouth of the Lyang river. Over the

inner end of the bay hangs the highest of the Banka mountains, called Gunong Marass, or Maradi. This beautiful mountain is easily recognized by its three peaks, the summits of which may often be seen when passing through Banka strait, presenting somewhat the appearance of a crown. The highest of the peaks, 2,320 feet high, is in lat. $1^{\circ} 51' S.$, and long. $105^{\circ} 53' E.$

Tanjong Punyusah, the eastern point of Klabat bay, is a long low projection, with an islet and some rocks extending nearly 2 miles from it.

Karang Trasseh Laout is a reef with only 2 fathoms water over it, and 10 and 11 fathoms around it, lying about 3 miles N.W. $\frac{1}{2}$ N. from Tanjong Punyusah. From the reef the west point of Punyusah islet is in line with the hill near Monkubur point, bearing S.S.E., Moncudu islet East, and Mount Mallallu, S.W. by W. $\frac{1}{4}$ W.

A boat of H.N.M. schooner *Dolphin*, in May 1846, examined this reef, and found it to be of small extent, with not less than 3 fathoms over it, and 11 to 12 fathoms around it.

Anchorage.—Vessels coming to Klabat bay for cargoes of tin, usually anchor outside the entrance, between its eastern point and the Trasseh reef, in $9\frac{1}{2}$ or 10 fathoms, soft muddy bottom, having Punyusah islet in line with Mount Marass S.S.E. $\frac{1}{2}$ E., Klabat hill S.S.W. $\frac{1}{2}$ W., Mallallu point W. by S. $\frac{1}{4}$ S., and Moncudu island E. $\frac{3}{4}$ N.

The COAST, from Tanjong Punyusah, takes, with a slight curve inland, a direction about E. by N. for $10\frac{1}{2}$ miles, to a point abreast of a small islet named Pulo Moncudu; and from thence East for $2\frac{1}{2}$ miles to Tanjong Crassok, the northernmost point of Banka, in lat. $1^{\circ} 29' S.$, long. $105^{\circ} 57\frac{1}{2}' E.$ Many rocks lie close to this part of the coast, and shoal water extends nearly a mile from it. From Tanjong Crassok the coast trends to the south-eastward, forming the north-east coast of Banka, for a description of which see pages 137 to 143.

A Reef, having 2 fathoms water over it, lies about 2 miles off shore with Moncudu islet bearing East, and Gunong Chundong S.E. $\frac{1}{2}$ S.

CHAPTER IV.

GASPAR STRAIT.—NORTH-EAST COAST OF BANKA.—
SHOALS NORTHWARD AND NORTH-WESTWARD OF
GASPAR STRAIT.VARIATION, $1^{\circ} 10'$ East in 1866.

GENERAL DESCRIPTION.—The strait of Gaspar, between the large islands of Banka and Billiton, derives its name, as we are informed by Horsburgh, from the Spanish captain who passed through it in 1724, though Captain Hurle had previously done so when returning from China in the *Macclesfield* galley, in March 1702. Many small islands divide the strait into three principal branches, having the names of Macclesfield, Clements, and Stolze channels. The first, through which the *Macclesfield* passed, is formed by Lepar and Leat islands. The second is named after Captain Clements, who commanded a fleet of English India ships in 1781, and who, on returning from China, chose the passage formed by Leat, Barn, and Saddle islands to the westward, and North and South islands to the eastward. The third, Stolze channel, is bounded by Table island on the west side, and Mendanao, or Long island, on the east side, and is so named after the Dutch naval officer, J. Stolze, who was deputed to ascertain the positions of the islands on the west coast of Billiton.*

Although the navigation of this strait is encumbered with many dangers, yet as the course by it is more direct, and the distance less than by that of Banka, many seamen are induced to prefer it, especially when returning from China late in the N.E. monsoon. The comparative advantages of both straits with reference to vessels bound to Singapore and China have been shown at page 2; and it will only be necessary here to add a few remarks with reference to those returning from China.

The fast clipper ships which every season contend for the honour of landing the first of the year's teas in England, usually proceed through Gaspar strait, as do most homeward bound ships to whom saving of

* See Charts:—Gaspar Strait, with Views, No. 2,137, scale, $m = 0.4$ of an inch; and Gaspar and Banka Straits, No. 2,149, scale, $m = 0.14$ of an inch.

time is of the first importance, and there can be no doubt but they will continue to do so in preference to the more circuitous, although much safer, route of Banka strait. Until, however, the correct positions of the shoals and dangers known to exist to the northward of Gaspar strait are determined, and this space properly explored, vessels must keep a vigilant look out when approaching the strait from the northward, and be prepared for the possibility of meeting with some danger not marked on the charts. Nor must they relax their vigilance when getting near to Pulo Leat, and when passing through the strait. No opportunity should be lost of determining the ship's exact position; and the greatest attention should be paid to ascertaining the set of the current and to guard against its effects. Many fine ships have been lost in Gaspar strait;* not a few on the Alceste reef, from wrongly estimating their distance from the land; but in the majority of instances from causes which might have been guarded against by the exercise of due care and judgment.

Macclesfield channel is the one generally taken, although Stolze channel appears to be much less intricate, and more free from danger. Clements channel is much narrower than either of the other two, and being encumbered with dangers in its narrowest part, its navigation is more difficult and unsafe.

Gaspar strait was surveyed in 1854 by the officers of the United States navy attached to an exploring expedition; and in the following description of the dangers, most of the positions, bearings, and distances, &c. have been taken from the chart, No. 2,137, constructed by them.

DANGERS SOUTHWARD OF GASPAR STRAIT.

Dangerous shoals extend for about 35 miles to the southward of Gaspar strait, rendering great caution necessary when approaching the strait from that direction.

HANCOCK SHOAL, in lat. $3^{\circ} 34\frac{1}{4}'$ S., long. $107^{\circ} 6' 20''$ E., is the most southern of the authenticated dangers at the entrance of Gaspar strait. It is a small patch about a quarter of a mile in extent, but whether composed of sand or coral does not appear on the chart. It has only one fathom of water over it, and 6 to 7 fathoms around it.

DOUBTFUL DANGERS.—A Doubtful rock was marked in former charts at $3\frac{3}{4}$ miles S.W. by W. $\frac{1}{4}$ W. of the Hancock shoal; a small shoal

* In the Nautical Magazine for 1861 it is stated that "the *Herculanum*, with a cargo of tea and silk valued at 70,000*l.*, was totally lost on the Alceste reef, being the ninth vessel lost this year in Gaspar strait." In the early part of 1865 five vessels were totally lost in Gaspar strait, three of them upon the Alceste reef.

of 6 feet water, named Mary Goddard, at $4\frac{1}{2}$ miles S.S.E. of the Hancock ; and another of 12 feet water, named Sharpshooter reef, at 11 miles W. $\frac{3}{4}$ S. from the Hancock ; but a careful search having been made for these dangers in May 1866 by Mr. Wilds, Master commanding H.M. Surveying Vessel *Swallow*, without the slightest indication of their existence, they have been expunged from the charts.

HIPPOGRIFTS SHOAL.—Mr. Wilds also searched for the Hippogriffe shoal,* and found it in lat. $3^{\circ} 33' 36''$ S., long. $106^{\circ} 54' 30''$ E. It is a dangerous boulder rock, with only 3 feet over it at low water, of circular shape, and about 150 feet in diameter, having large branches of coral upon it. It was not seen until close to, and at the time it was examined there was not the slightest swell or ripple to indicate its position ; the weather being fine and clear, and the wind light from the S.S.E. Regular soundings of 8 fathoms, sand and shell, were found around it, and the water in that depth was of a pale colour.

TURTLE SHOAL lies about 2 miles N.E. by E. from the Hancock shoal, and is of about the same extent ; it has but 3 feet water over it, and 8 to 12 fathoms around it. There are tide ripples over this shoal.

LARABE SHOAL, in lat. $3^{\circ} 33'$ S., long. $107^{\circ} 11\frac{3}{4}'$ E., and distant nearly 6 miles E. by N. $\frac{1}{4}$ N. from the Hancock shoal, is about a third of a mile in extent, having $3\frac{1}{4}$ fathoms of water over it, and 5 to 8 fathoms around it.

SAND ISLAND is the name given to a small patch of sand, just awash at high water, with 8 to 14 fathoms water around it, lying about 4 miles northward of the Larabe shoal, in lat. $2^{\circ} 59'$ S., long. $107^{\circ} 11' 20''$ E. At a third of a mile E.N.E. from Sand island is a shoal patch about a third of a mile in extent, having $2\frac{1}{2}$ fathoms water over it and 8 to 9 fathoms around it ; the tide also ripples over this bank.

There is a danger, named Padang reef, marked on the chart about $2\frac{1}{4}$ miles W. $\frac{1}{2}$ N. of Sand island, but we have no information about it.

MIDDLE REEF, lying N.N.E. $\frac{3}{4}$ E. nearly $2\frac{1}{2}$ miles from Sand island, appears to be a rock, just above water, on the north end of a small sand patch having 2 fathoms water over it, and 8 to 9 fathoms around it.

BRANDING BREAKERS.—North-west, nearly $1\frac{3}{4}$ miles from Middle reef, are two small patches occupying a space about two-thirds of a mile in extent, E.N.E. and W.S.W., and with 12 fathoms water between them. The western patch has $1\frac{1}{2}$ fathoms water over it, the eastern one only 3 feet ; all around them are 7 or 8 fathoms.

* Named after an American ship lost on it.—Mercantile Marine Magazine for 1860, page 65.

FAIRLIE ROCK, in lat. $3^{\circ} 27\frac{1}{4}'$ S., long. $107^{\circ} 1' 20''$ E., was discovered by the East India Company's ship of that name grounding upon it in 1813. It is of coral, about a cable's length in diameter, nearly awash at low water, and 6 or 7 fathoms close around it. The sea breaks over the rock, and all around are overfalls caused by the rocky and uneven character of the bottom. From its Entrance point, the south-eastern extreme of Pulo Lepar, bears N. by W. $\frac{1}{2}$ W., distant $26\frac{1}{4}$ miles, and Shoal-water island N.E. by E. 15 miles, and just in sight from the deck of a large ship; therefore to avoid this rock, Shoal-water island must, from the deck of a large ship, be sunk below the horizon by the time it bears N.E. by E., this island being the only land distinctly visible from the rock.

SHOAL-WATER ISLAND and **SHOALS** form a group amongst which it would not be prudent to venture. Shoal-water or Embleton island, in lat. $3^{\circ} 19\frac{1}{2}'$ S., long. $107^{\circ} 14'$ E., is a little more than half a mile in diameter, and from it Middle reef bears S. $\frac{3}{4}$ W., distant 8 miles. Hancock is a small islet lying N.E. $\frac{1}{2}$ N. three-quarters of a mile from Shoal-water island.

Dangerous reefs surround both these islands, among which are some deep but very narrow and intricate channels. From Shoal-water island a reef extends from half to three-quarters of a mile, on its south-east, south, and south-west sides; and about half a mile off its west side is a small detached reef having 10 fathoms between it and the reef bordering that side of the island: off its east side reefs extend nearly $1\frac{1}{2}$ miles. The reefs surrounding Hancock island are separated from those around Shoal-water island by a very narrow channel with depths of 6 to 10 fathoms in it. On the north-east side of Hancock the reef extends about a third of a mile, and on its north-west side about three-quarters of a mile, with some rocks above water on its outer edge.

One-fathom Patch.—A patch having but one fathom water over it, and 7 to 9 fathoms around it, lies W. $\frac{1}{4}$ N. nearly 2 miles from Shoal-water island.

Embleton Rock is just above water on the north-west extreme of a bank of hard sand, which nearly dries, distant 2 miles N.N.W. $\frac{3}{4}$ W. from Shoal-water island; there are 12 to 14 fathoms around it.

Bliss Shoal, lying N.E. by E. nearly a mile from Embleton rock, and N. $\frac{3}{4}$ W. $2\frac{1}{4}$ miles from Shoal-water island, is about a third of a mile in extent, N.W. and S.E.; it has only a quarter of a fathom water over it, and 6 to 14 fathoms at a short distance from it.

There appear to be no dangers between the reefs contiguous to Shoal-water and Hancock islands, or between One-fathom patch, Embleton rock, and Bliss shoal, the soundings being from 6 to 14 fathoms; but vessels had

better keep well outside, as there is nothing to be gained by venturing among these dangers.

BLAS MATEU ROCK is said to lie right in the fair-way track of vessels proceeding through Gaspar strait by the Macclesfield channel. The American surveyors searched for it without success, but their chart does not exhibit many soundings in that vicinity, and it would be very unsafe to disregard its reputed existence in the face of the following circumstantial account, which is taken from page 294 of the Java Guide :—The Blas rock was first discovered on September 23, 1839, by the Spanish brig *San Joachim*, Captain Blas Mateu. Having anchored in 12 fathoms, coarse sand, he took the boat and found three rocks, each about 10 feet in diameter. Upon the northern rock he had 9 feet, on the southern 12 feet, and on the western 17 feet water, and between them passages of $4\frac{1}{2}$ fathoms. Shoal-water island bore E. $\frac{1}{4}$ N., the opening between the two hills on Lepar island N.N.W. $\frac{1}{2}$ W., and the latitude determined by the sun's meridian altitude $3^{\circ} 20' 38''$ S. The whole extent of the three rocks is about half a cable's length, and round them the depths were 12, 13, and 14 fathoms; but there was reason to believe that there were more rocks, because the chain parted while the anchor was being weighed.

Another Spanish captain, M. Aldon, who examined these rocks afterwards, gives them a similar description, and states that the light colour of the water over them was distinctly visible at a considerable distance N.N.W. of them. He places them in $3^{\circ} 21'$ S., with Fairlie rock S.S.E. $\frac{3}{4}$ E., Shoal-water island East, and the hills of Lepar island N.N.W.

To avoid this danger Entrance point must not be brought more to the westward than N. $\frac{1}{2}$ W., when Shoal-water island bears between E. $\frac{1}{2}$ S. and E. $\frac{1}{2}$ N.

SAND-BANKS.—At 12 miles South of Entrance point is a patch of 5 fathoms; and at $2\frac{1}{2}$ miles W. $\frac{1}{2}$ S. of this is another of the same depth; between them the depth is 7 fathoms. These spots appear to be on the eastern end of one of the long sand ridges which lie to the southward of Banka (page 66), probably an extension of the strip upon which is shown the following sounding of $4\frac{1}{2}$ fathoms.

A bank* in $3^{\circ} 19'$ S., with $4\frac{1}{2}$ fathoms water, lies South from a remarkable hummock in Banka; and there are two other banks of 5 fathoms, from which a hummock upon the long low point of Baginda bears N.N.W. $\frac{1}{4}$ W.

* The account of this and of the two 5-fathoms banks is taken from the Java Guide, page 293. The $4\frac{1}{2}$ fathoms was not found by Mr. Stanton, and the latter would appear by the American survey to be farther to the eastward. It is, however, very possible that other 5-fathoms patches may exist, as the American chart exhibits no soundings in this direction.

To avoid these banks the low land which unites the hills of Banka must be kept from a vessel's deck below the horizon, till Entrance point bears N. by E., when a vessel may steer towards the strait; taking care not to bring this point more to the eastward than N. by E. or N. $\frac{1}{2}$ E.

VANSITTART SHOALS are a collection of rocky patches divided into groups, lying between the bearings of S.E. $\frac{1}{2}$ E. and E. $\frac{3}{4}$ S., distant about 12 miles from Entrance point, and extending from lat. $3^{\circ} 10'$ to $3^{\circ} 4'$ S. At their southern part are two patches, lying E. $\frac{1}{2}$ S. and W. $\frac{1}{2}$ N. from each other, their inner edges being about $2\frac{1}{2}$ miles, and their outer edges nearly $3\frac{1}{2}$ miles apart. From the western patch of $1\frac{1}{2}$ fathoms water, Entrance point bears N.W. $\frac{1}{2}$ W. 12 miles, Shoal-water island S.E. $\frac{1}{4}$ E. 14 miles, and Barn island N.N.E. $\frac{1}{4}$ E. 12 miles; from the eastern patch of only 3 feet water, Shoal-water island bears S.E. $\frac{1}{2}$ S. $11\frac{1}{2}$ miles, and Barn island N. by E. $\frac{1}{4}$ E. 11 miles.

Nearly the centre of the space occupied by these shoals are a group of patches extending N.E. and S.W. about a mile, some having but one fathom over them, and one patch, the north-eastern, dries at low water.

The patches at the northern end of the shoals lie close together, and extend in an E.N.E. and W.S.W. direction, about $2\frac{1}{2}$ miles. One or two of them are dry, and others have but 3 feet water over them at low tides. From the south-west patch, which dries, Barn island bears N.N.E. $\frac{1}{2}$ E., distant $6\frac{1}{2}$ miles; the south extreme of Saddle island is open of the south extreme of Low island, N.E. by E. $\frac{1}{2}$ E.; and Pulo Jelaka bears N. by W. $\frac{3}{4}$ W. 13 miles. From the north-east patch, of 2 fathoms water, Low island is distant $2\frac{1}{2}$ miles, with its south extreme in line with the middle of Saddle island, bearing N.E. by E.; and Sand island is just open of the east extreme of Pulo Leat, bearing N. $\frac{1}{2}$ W.

For the marks to clear the Vansittart shoals, *see* directions, page 114.

Soundings.—At 3 or 4 miles south of the Vansittart shoals are 12 or 13 fathoms. About $1\frac{1}{2}$ miles south of the south-western extreme are 19 or 20 fathoms, but close to it on that side are 17 fathoms. The soundings deepen from the southward towards the south-eastern extreme; at three-quarters of a mile from it are 16 fathoms, increasing to 19 or 22 fathoms close to the shoal. On the east side of the southern and middle groups of patches are 13 fathoms close-to, decreasing to 11 and 9 fathoms at from 2 to 4 miles; but near the northern group the water on the east side is somewhat deeper, from 14 to 17 fathoms close to the patches, and from 15 to 18 fathoms 2 or 3 miles off. The soundings on the west side of the shoals vary from 21 to 28 fathoms, decreasing towards the Banka shore.

GEORGE BANKS is the name given, on the American chart, to four or five patches, under a depth of 5 fathoms, lying southward and south-

westward of Entrance point. The southern extreme of one of these patches which is about $1\frac{1}{2}$ miles long North and South, half a mile broad, and has 3 fathoms water on it, lies S.W. $\frac{1}{2}$ W. 4 miles from Entrance point. About a mile south-west of this patch is another, but smaller one, of $3\frac{1}{2}$ fathoms water; and 5 miles S.W. by W. $\frac{1}{2}$ W. from this last patch, or S.W. $\frac{1}{4}$ W. 9 miles from Entrance point, is a patch of $3\frac{1}{2}$ fathoms water, but this latter lies quite out of the ordinary track of vessels. All these patches lie within the edge of the 10-fathoms line, which, passing Entrance point about $1\frac{1}{2}$ miles off, runs, with an irregularly curved outline, to the south-westward.

A bank, under a depth of 10 fathoms, which assumes on the chart the form of a shoulder of mutton, with its small end to the north-eastward, lies nearly 2 miles outside the 10-fathoms line extending from Pulo Lepar. From a position S. $\frac{3}{4}$ W. distant 10 miles from Entrance point, the outer edge of this bank runs in a N.E. by N. direction for 10 miles, until Entrance point bears about W.N.W., and is distant 5 miles. Between the shoulder of mutton and shore banks the depths are 13 to 17 fathoms.

Two-and-a-half Fathoms Bank.—About the middle of the above shoulder of mutton-shaped bank, and about a mile from its outer or eastern edge, is a patch of only $2\frac{1}{2}$ fathoms water. This was formerly known as the George bank, because the ship *Royal George* had in 1813 passed over its edge in $5\frac{1}{2}$ fathoms; it was afterwards explored by Captain D. Ross. From it Entrance point bears N. $\frac{1}{3}$ W., distant $6\frac{1}{2}$ miles; and Baginda peak, on Banka island, W. by N. $\frac{3}{4}$ N., $12\frac{1}{2}$ miles. To avoid this bank, keep the high trees near Klippige point, or Rocky point hill, open to the eastward of Entrance point.

About 2 miles West of the $2\frac{1}{2}$ -fathoms bank is a small patch with 5 fathoms water over it.

Two-fathoms Patch.—It would appear from the following report of Captain Keay, of the ship *Falcon*,* that a patch having but 2 fathoms water over it, lies about 3 miles to the southward of Round island:—

“At 9 a.m., March 13th, 1862, clear, light, northerly, and smooth sea; steering towards Entrance point, Gaspar strait; Round island bearing N. $\frac{1}{2}$ W. by compass, apparently 3 miles distant, the *Falcon*, drawing 18 feet, ran aground on a small sand patch, with 15 feet water over it, ship's head N.E. by E. $\frac{1}{2}$ E. The depth did not vary until 10 a.m., then began to fall, and at 6 p.m. there was barely 12 feet water amidships; the diameter of the shallowest part was about 30 feet. At low water had 16 feet under the bows, 19 feet under the stern, 12 feet abreast of main

* *Mercantile Magazine* for 1862, p. 285.

rigging ; and to the southward from ahead to right astern, at the distance of half a cable's length, the depths were 3 to $3\frac{1}{2}$ fathoms. It is scarcely possible, with such opportunity of judging, to be a quarter of a mile wrong in stating a 3 miles' distance from Round island : it may therefore be a detached bank, as the southern edge of the 3 to $3\frac{1}{2}$ fathoms shoal by Admiralty chart bears a point more easterly, and is only $2\frac{1}{4}$ miles from Round island ; also the small $3\frac{1}{2}$ -fathom patch, about $2\frac{1}{2}$ miles S. by W. from the island, cannot be the same spot. Had circumstances permitted, this might have been determined by sounding ; had no time for doing so more than was necessary to get the ship off and proceed while a leading N.W. wind lasted."*

MACCLESFIELD CHANNEL.

The approach to the Macclesfield channel from the southward, is bounded on the eastern side by the Hippogriffe shoal, the Doubtful dangers (page 100), the Fairlie rock, and the Vansittart shoals ; and on the western side by the outermost of the George banks. The Blas rock, if it exists, lies right in the fairway.

The Hancock and Turtle shoals may be said to form a point, from which the shoals already mentioned as bounding the eastern limit of approach to Macclesfield channel diverge in one direction, whilst those forming the western limit of approach to Stolze and Clements channel diverge in another ; these last may also be said to form the eastern limits of the southern entrance to Macclesfield channel, as vessels may stand to the eastward of the Fairlie rock over towards them, if they should find it convenient to do so.

EAST COAST of BANKA.—From Tanjong Baginda (page 64), the south-western limit of Gaspar strait, the coast of Banka turns sharp to the northward, and after running 4 miles in a northerly direction, forms a large bay, the northern limit of which is Brekat point, which is also the north-western limit of Gaspar strait. There are several rivers upon this part of the coast, the principal of which, the Medang, is sometimes visited by coasters, but little is known of it.

LEPAR STRAIT, between Banka and Pulo Lepar, is 6 or 7 miles wide at entrance, but narrows to less than 2 miles some 4 or 5 miles within. The entrance appears from the chart to be barred, although there seems to be deep water inside. It is said to be so crowded with small islands and reefs, as to be available only for small coasters. The most southern of these islands, named Sugar-loaf, is very conspicuous, rising to a peak 915 feet high.

* As the vessel remained ashore all day, it is much to be regretted that no bearings were taken of Entrance point, Baginda hill, and other objects, to determine the position of this danger, which now rests upon a bearing of Round island and a guess at the distance from it.

PULO LEPAR is an irregularly shaped island, about 12 miles in diameter, lying close off the southern part of the east coast of Banka. On its southern part are several ranges of hills of moderate elevation; viz.:—Six peak range 781 feet high, Maroon hill 850 feet, Four peak range 750 feet, and two hills not named on the chart 650 feet high; farther to the westward is a hill 700 feet high, named False Sugar-loaf.

Entrance Point, the south-eastern extreme of the island, is in lat. $3^{\circ} 2' S.$, long. $106^{\circ} 54\frac{1}{2}' E.$ The land over it is hilly, and the point is bordered by a reef, extending 1 or 2 cables' lengths from it.

Pergam or Round island is a small islet surrounded by reefs, lying W.S.W. $2\frac{3}{4}$ miles from Entrance point, and about half a mile off the south coast of the island.

False Rocky point bears N. $\frac{3}{4}$ E., distant 4 miles from Entrance point. Immediately to the northward of it is a small stream named Red river.

Klippige or Rocky Point, the north-east extreme of Pulo Lepar, is distant $1\frac{1}{2}$ miles N. $\frac{1}{2}$ E. from False Rocky point. Rocky point hill, 522 feet high, stands $1\frac{3}{4}$ miles to the westward of the point.

At $1\frac{1}{2}$ miles N.W. $\frac{3}{4}$ W. from Klippige point is Tree point, from which the coast runs nearly straight to the north-westward for about 6 miles.

Shore Reef.—The whole coast from Entrance point to Tree point is fronted by a reef, which at about 2 miles northward of Entrance point, just to the southward of the entrance of Fresh-water river, extends off to the distance of $1\frac{1}{2}$ miles; it then runs nearly straight to the northward, and rounding Klippige point at a quarter of a mile, turns to the north-westward, and beyond Tree point projects but a short distance from the shore.

Water.—To the northward of Entrance point the coast forms a bay, in which are two small rivers. Vessels may anchor about a mile to the north-eastward of the point, abreast of which position is a sandy beach. Captain Ross watered here, and found the water a little tinged with a red colour, but it produced no pernicious effect upon the crew.

KLIPIGE SHOALS is the name given to three or four reefs, with rocks above water on them, and deep channels between them, lying off Klippige point. The outer reef lies E. by N. $\frac{3}{4}$ N. 2 miles from the point; the southern reef, over which is a depth of 4 fathoms, lies E. $\frac{1}{2}$ N., 2 miles from False Rocky point.

Close to these shoals are depths varying from 9 to 14 fathoms, and there appears to be a channel three-quarters of a mile wide, with 6 to 10 fathoms in it, between them and the shore, but it would be a very unwise proceeding for vessels to venture to use it.

DISCOVERY ROCKS appear on the American chart as two rocks lying N.N.E. $\frac{1}{2}$ E. $3\frac{3}{4}$ miles from Klippige point, with a shoal bank extending

nearly half a mile north-eastward of them. Close to the rocks and bank are 6 to 10 fathoms, with 13 to 15 fathoms at a short distance all around them.

Captain D. Ross, in the *Discovery*, was the first to determine the exact position of these rocks, and he gives the following description:—"I once before passed very near the situation of this rock without perceiving any indication of danger, but while passing at this time I observed a breaker (it was low water and spring tide), which on examination was found to be on a sunken coral rock, in diameter about 30 yards, having only 2 feet water upon it, and with perpendicular sides, as within a boat's length of it there were 7 fathoms water. Notwithstanding it had only 2 feet water, the sea did not break upon it above once an hour. In the vicinity of the rock the depth is 20 fathoms, but a rocky bank or ridge projects from it about a quarter of a mile to the eastward, with 6, 7, 10, and 15 fathoms on its eastern extremity. From the rock Entrance point bore S. by W. $\frac{1}{2}$ W., a rocky point S.S.W., Saddle island S.E. by E. $\frac{1}{4}$ E., the south point of Leat island E. $\frac{3}{4}$ S. nearly, the highest clump of trees upon that island East, its north point N.E. by E. $\frac{1}{4}$ E., the hummock on Brekat point N. by W. $\frac{3}{4}$ W., and lying 4 miles from Jelaka island, and the same distance from Klippige point."

A rocky Patch, with only 3 feet water over it, lies about $1\frac{1}{2}$ miles W. by S. from the Discovery rocks. In the channel between the soundings are from 10 to 16 fathoms.

PULO LEAT, which separates Macclesfield channel from Clements channel, is about $5\frac{3}{4}$ miles long, north and south, and $4\frac{3}{4}$ miles wide. Upon it are several hills, 400 to 600 feet high, which appear at a distance like a group of islands.

Pulo Jelaka is a small islet lying about a quarter of a mile north-westward of the west point of Pulo Leat, to which it is connected by a reef of rocks.

A dangerous reef surrounds both Pulo Leat and Pulo Jelaka, in addition to which are numerous outlying rocks in many places, extending far from the shore.

The south and south-west coasts of Pulo Leat are fronted by a reef which projects from the shore in a convex form to seaward for the distance of a mile. Off the south-east point of the island are outlying rocks and dangers extending in a S. by W. $\frac{1}{4}$ W. direction, to the distance of nearly $2\frac{1}{2}$ miles. A rock also lies about three-quarters of a mile South of Jelaka, just outside the edge of the reef extending from the shore, but there are no other outlying reefs on the south-west coast of the island.

West three-quarters of a mile distant from Jelaka, outside the reef extending from the shore, is a 3-fathoms patch; and N.W. by W., more

than a mile from that islet, is a rock near the water's edge, with 11 fathoms water between it and the shore reef. All along the north-west shore of Pulo Leat, and at little less than 2 miles from it, are numerous outlying rocks and patches of reef, between which and the reef extending from the shore are some dry sand-banks.

LAMMERMUIR ROCK.—Capt. Joass, of the British ship *Lammermuir*, reports that at 2 h. 20 m. a.m. 31st December 1863, when proceeding through the Macclesfield channel, his vessel struck on a rock, the position of which, from bearings taken, is lat. $2^{\circ} 53' S.$, long. $107^{\circ} E.$

In the account published in the "Straits Times" it appears that the vessel remained only a very short time on the rock, during which period "she was hanging on a point, twisting round." Under these circumstances accurate bearings could not have been taken, especially at night-time, and a half a point out in the bearing of Entrance point would place the vessel on the reefs off Jelaka islet.

H.M.S. *Rifleman* has since searched for this rock, but could find no danger in the vicinity of the position ascribed to it.

ALCESTE REEF.—The Alceste rock, upon which H.M. ship of that name was wrecked in February 1817, when returning from China with Lord Amherst and suite, is the outer patch of a coral reef which projects nearly 2 miles from the north point of Pulo Leat, and has but 2 fathoms water on its shallowest part. It is the same reef upon which, in 1816, the Portuguese ship *Amelia* was wrecked, the remains of both her and the *Alceste* being still visible, with only a few yards between them, at the time the reef was surveyed by Captain D. Ross. The wreck of the *Alceste* was lying $1\frac{1}{2}$ miles from the north point of Leat, with the west point of Jelaka in one with the southern sand-bank west of Leat; the northern sand-bank in one with a white rock which lies between Jelaka and the north-west point of Leat and close to it; and a white rock near the north-west point open to the eastward of a high tree on the centre of the eastern hill of Leat.

Many ships have since been lost on this reef, or on some of the coral patches contiguous to it, and they have generally furnished bearings which would show them to have been wrecked some distance from these dangers; but the wrecks of several of them have afterwards been found upon, or close to the Alceste reef; and two such wrecks, the *Cornelius Haja* * and the *Memnon*, have found a place on the American chart. There is good reason to believe that there is no danger in the fairway of the Macclesfield channel in this vicinity.

The soundings round Alceste reef do not by any means afford a

* This vessel was reported to have struck on a rock in lat. $2^{\circ} 44\frac{1}{2}' S.$, long. $107^{\circ} 1' E.$ Horsburgh.

certain guide, although to the north-eastward they appear to be a few fathoms shoaler than elsewhere. Close-to on the west side are 17 fathoms, and from 15 to 21 fathoms at the distance of one or two miles ; close-to on the north side 12 fathoms, with 16 to 18 fathoms at one or two miles ; and close-to on the north-east side 16 fathoms, with 12 to 17 fathoms at one to two miles.

LIED SHOAL.—The barque *Carl Ronneberg*, Captain C. L. Lied, is reported to have struck upon a rock about 6 miles to the northward of the Alceste reef, in lat. $2^{\circ} 42' S.$, long. $107^{\circ} 5' E.$ It is said to be about a cable's length in circumference, having from 4 to 20 feet water on it, and surrounded by depths of 19 fathoms.

The American chart exhibits many soundings in the locality ascribed to this danger, which were obtained in searching for the rock on which the *Cornelius Haja* was reported to have been wrecked, said to lie W.S.W., distant 4 miles from the reported position of the Lied rock. Mr. Richards, in H.M.S. *Saracen*, also carefully searched for the *Cornelius Haja* rock without discovering any danger in that locality : for these reasons the Lied rock is not placed upon the Admiralty charts, and the wreck of the *Cornelius Haja* (as mentioned above) was subsequently found by the American surveyors upon the Alceste reef.

KILAPAN and SENIOR are two hilly islands lying 2 or 3 miles north of Pulo Lepar. Kilapan is about $1\frac{1}{2}$ miles in extent east and west, and a mile wide ; and bears from Klippige or Rocky point N.W. by N. $6\frac{1}{4}$ miles. Senior is not quite so large as Kilapan, from which it bears W. by N. 2 miles.

WILSON BANK, discovered by Captain Lestock Wilson, of the *Car-natic*, in February 1787, has but one fathom water on its shoalest spot, although Captain Wilson did not find less than 3 fathoms. From the one-fathom spot the extreme of Brekat point bears N.N.W. $\frac{1}{4}$ W. $6\frac{1}{2}$ miles ; the hummock just inside the point, which is more conspicuous, bearing N.W. by N. The bank extends about a mile to the northward of the shoal patch, having $2\frac{3}{4}$ fathoms over that part of it ; to the southward it extends about a quarter of a mile. Close-to on the east side are 13 or 14 fathoms, but to the N.N.E. 8 to 10 fathoms for about $1\frac{1}{2}$ miles, when the depths suddenly increase to 19 or 20 fathoms. The extreme of Brekat point bearing N.W. by N., or the hill over it N.W., leads a mile outside Wilson bank, as does also the eastern extreme of Kilapan island bearing S. by W. $\frac{1}{4}$ W. The same bearings also clear the elbow of Brekat bank.

BREKAT BANK.—A long narrow strip of bank, which appears to have from 3 to 4 fathoms water over it, and deeper water inside of it, runs in a N. by E. direction from 3 or 4 miles to the southward of Wilson bank

and, passing about $1\frac{1}{2}$ miles westward of that shoal, forms about a mile farther on, an elbow projecting to seaward, with $1\frac{1}{2}$ fathoms water on it, and a small patch which dries at low water; it then takes a N. by W. $\frac{1}{2}$ W. direction, until it joins the bank extending from Brekat point, which bears from the elbow N.N.W., distant 4 miles.

The soundings in the channel between Brekat and Wilson banks, are $4\frac{1}{2}$ to 8 fathoms. Near the elbow they decrease suddenly from 10 fathoms; there are 9 or 10 fathoms at $2\frac{1}{2}$ miles eastward of the elbow, and 12 and 15 fathoms at a mile north-east of it.

BREKAT POINT, in lat. $2^{\circ} 34'$ S., long. $106^{\circ} 51\frac{1}{2}'$ E., has a rock off it 28 feet high, and forms the eastern extreme of Banka, and the north-western limit of Gaspar strait. The land from the inner part of the projecting point falls away to the southward, and has a hill or hummock 620 feet high upon it. Immediately off the point are some rocks, and shoal water extends nearly a mile from it to the eastward. The point should not be approached nearer than 2 miles, the soundings off it being deep and irregular, 14 to 21 fathoms.

AKBAR SHOAL.—The American ship *Akbar* struck in 1843 upon a shoal having only 12 feet water upon it, in lat. $2^{\circ} 39'$ S., long. $107^{\circ} 13\frac{1}{2}'$ E. In the American chart the position of this shoal is marked doubtful, so that the American surveyors did not succeed in finding it.

The ship *Scawful* reports that on 23rd March 1864 she passed close to the Akbar shoal, which had apparently very little water on it, though no breakers, as the sea was quite smooth. It appeared to be a narrow ridge of coral, about 2 cables long, north and south, and not half a cable wide. Its position is given as lat. $2^{\circ} 37\frac{1}{2}'$ S., long. $107^{\circ} 16'$ E.*

This places the shoal 3 miles N.E. by E. from the position ascribed to it by the *Akbar*; in either case it is much in the way of vessels proceeding through Clements or Stolze channels, and until its exact position be determined, it will be necessary to keep clear of the localities in which it is reputed to lie.

TREE ISLAND, distant 10 miles N.E. $\frac{1}{4}$ E. from Brekat point, and 7 miles S.W. by W. $\frac{1}{2}$ W. from Gaspar island, is a barren rock, 40 feet high, with two or three trees on the summit, giving it the appearance of a ship under sail, and making it visible 15 miles. It is surrounded by a coral reef, and a rock about as high as a boat lies a third of a mile south-eastward of it. There is a cave upon this island where the Malays come to collect birds' nests, which are probably found also on the other islands.

* "Shipping Gazette," 6th June 1864.

A detached coral reef lies more than half a mile north-east of the island, and another about the same distance south-east of it; between these reefs and the one surrounding the island are narrow channels, with deep water.

GASPAR ISLAND, in lat. $2^{\circ} 24\frac{1}{2}'$ S., long. $107^{\circ} 5\frac{1}{2}'$ E., bears N. $\frac{1}{4}$ E. $24\frac{1}{2}$ miles from the north point of Pulo Leat, and N.E. $\frac{3}{4}$ E. nearly 17 miles from Brekat point. Its centre rises to a peak 812 feet high, which may be seen in clear weather at a distance of 30 miles, and is the principal mark for avoiding the shoals in sailing to or from the northern part of the strait. It is nearly surrounded by a reef, which projects from the south and east points of the island about a third of a mile; the west and north points are bold close-to. The soundings near the island are variable, 12 to 19 fathoms.

Water.—Fresh water is to be found upon this island, but the chart does not point out the particular spot where it may be obtained.

GLASSA ROCK, 24 feet high, with some trees on it, and rocks contiguous to it, lies about a mile westward of Gaspar island. It is surrounded by a reef extending about a third of a mile south-eastward and eastward from it, but not quite so far in other directions.

Gaspar island, Glassa rock, and Tree island, form the northern limit of Gaspar strait. The Canning rock, Warren Hastings reef, Belvidere shoals, and other dangers are described in pages 141, 143.

TIDES and CURRENTS.—It is high water, full and change, in the Macclesfield channel at 2 h. 30 m., and the ordinary rise is only 4 feet. The *Vansittart's* boat is reported to have found at Tree island a perpendicular rise of 18 feet, between the hours of 8 a.m. and 5 p.m.; but there is probably some mistake in this, as 12 feet is an extraordinary rise in Banka strait, into which some very large rivers disembogue.

The currents greatly depend upon the strength of the monsoon. When the monsoon is strong, the current will generally be found setting in the same direction at the rate of 2 or 3 knots an hour, but affected somewhat by the tides. In light winds and calms the tides are seldom very regular.

SOUNDINGS.—The soundings, many miles to the southward of the dangers at the entrance of Macclesfield channel, vary from 11 to 14 fathoms, with an occasional cast perhaps of 10 or 9 fathoms. About 11 miles south-westward of the Fairlie rock, however, they decrease to 9, 8, or 7 fathoms, and in one spot, about $1\frac{1}{2}$ miles north-westward of the Blas Mateu rock, to 6 fathoms. These shoal soundings are on an extensive bank of a very irregular form, which projects from the southern part of Banka strait, across the entrance of Macclesfield channel, and then trends away

many miles in a south and somewhat easterly direction. Most of the southern shoals at the entrance of the strait are on this bank, and there are also a few holes in it, where the depths of water are 2 or 3 fathoms greater. In the fairway of Macclesfield channel, this bank extends 3 or 4 miles to the northward of the latitude of Shoal-water island; on either side are 11 to 15 fathoms water. In the direction of a line between the Fairlie rock and the Vansittart shoals, the bank extends still farther to the northward.

Northward of this bank the soundings in the fairway of the channel are 14 and 16 fathoms, deepening to 18, 20, and 23 fathoms between the Vansittart shoals and the George banks. Near the former the water deepens to 24 or 27 fathoms, but shoals to 15 and 11 fathoms near the latter.

The soundings are deep, but variable, 16 to 23 fathoms, pretty close to the small islands and shoals which separate Macclesfield and Clements channels. The 10-fathoms line extends some distance from Pulo Lepar, and just to the northward of Entrance point a sort of tongue projects nearly 5 miles; from this tongue it falls back, and then passes outside the Klippige shoals, close to which are 13 or 14 fathoms. The 10-fathoms line runs some 6 or 7 miles in a S. by E. direction from Pulo Jelaka. In the fairway of the channel, between Entrance point and the small islands south-eastward of Pulo Leat, are 19 to 27 fathoms, and from thence, towards Pulo Jelaka and Discovery rocks, 23 to 30 fathoms. Between the latter points the soundings appear to be deeper than anywhere else in the channel, the chart showing one cast of 33 fathoms, and two or three of no bottom with 28 or 29 fathoms.

The lead will give but little warning when nearing the reefs extending from the north-west coast of Pulo Leat, close to which are 16 and 19 fathoms; but on the Banka side, between the Discovery rocks and Wilson bank, it would appear from the chart that vessels may stand into 10 fathoms, or even into 8 or 7 fathoms, with safety.

In the fairway of the channel the soundings decrease, a few miles to the northward of the Discovery rocks, to 29 and 27 fathoms, and abreast of the Alceste rock to 18 or 21 fathoms, which depths continue as far as Gaspar island. About 10 miles East of Brekat point is a patch of 12 fathoms.

Towards Entrance point the bottom in many places is mud, but often coarse sand with shells and stones, and in some places rock, particularly in the vicinity of the shoals on the Banka shore. Sand and broken shells with coral and mud in places appears to be the character of the bottom all over the strait; but about 5 miles N.W. by W. from the north point of Pulo Leat the bottom is black clay, good holding ground, and the depth here being no more than 17 or 18 fathoms, it is recommended as a good position for a ship to anchor, should she require to do so in this vicinity.

DIRECTIONS through MACCLESFIELD CHANNEL from the SOUTHWARD.—Proceeding towards the Macclesfield channel during the S.E. monsoon, having passed the Two Brothers (page 46), steer N. by E. $\frac{1}{2}$ E., or N.N.E., keeping midway between the Clifton shoal and the Brouwers reefs. The depths in this track are pretty regular, 10 to 15 fathoms, soft bottom. In thick weather, or if uncertain of the vessel's position, the entrance of Gaspar strait should be approached with great caution, keeping a good look-out for broken or shoal water.

Be also guarded when in the vicinity of the Blas Mateu rock, for although the American surveyors could not find that danger, yet, for reasons given at page 102, it would be unsafe to conclude that it does not exist. The Six-peak range (the first clump of hills to the westward of Entrance point) kept N. by W., will lead 3 miles westward of this rock, and when Baginda peak bears N.W. $\frac{1}{2}$ N., and the water has deepened from 8 or 9 to 11 or 15 fathoms, steer to the north-eastward until the highest trees on Klippige or Rocky point, or Rocky point hill, are well open of Entrance point, which will lead clear of the $2\frac{1}{2}$ -fathoms bank.

Being 3 or 4 miles to the northward of the Blas Mateu rock, a N. $\frac{1}{2}$ E. course,—guarding against currents,—for 14 miles, will lead about 5 miles eastward of Entrance point, and in this track the depths will be 13 to 18 fathoms; if the vessel gets too far to the eastward the water will deepen, and if to the westward it will shoal to 12, 11, or 9 fathoms. From 5 miles eastward of Entrance point, a North course for about 16 miles, which lead nearly midway between the shoals west of Jelaka and the Discovery rocks; in this track there will be from 14 to 25 fathoms till abreast Klippige or Rocky point, when there will be 23 or 24 fathoms, deepening to 30 or 33 fathoms between Pulo Jelaka and the Discovery rocks, having passed which they will decrease to 25, 19, and 16 fathoms. The vessel will now have arrived in a position with Pulo Kilapan bearing S.W. by W., and the north point of Pulo Leat S.E. by E., and may steer N. by E. $\frac{1}{2}$ E. for Gaspar island, in which track she will have 16 to 21 fathoms.

Since the survey of the sand-banks south of Banka by Mr. Stanton, it no longer appears dangerous to approach the coast to a less distance than 14 miles, and it might be convenient for a vessel to make Entrance point on a N. by E. or N.N.E. bearing, and pass inside the $2\frac{1}{2}$ -fathoms bank by keeping Klippige and Entrance points in line.*

* It is much to be desired that more soundings were obtained around, and in the vicinity of the 5-fathoms banks, because that would appear to be the safest direction to approach the strait from. The shoals at the entrance of the strait lie so far from any land, that a ship must rely upon her reckoning to avoid them, whereas if it were proved that there were no less than 5 fathoms on the banks southward of the George banks, a vessel could steer up boldly till within 7 or 8 miles of Entrance point, when a bearing of that point, or of the high land over it, and another of Baginda peak, would give her exact position.

To work through from the Southward.—During the northern monsoon it is very difficult, almost impossible, to work through Gaspar strait, even in the latter part of the monsoon, about March, when vessels are obliged to anchor often on account of the faintness of the wind and the rapidity of the southerly current.* In the southern monsoon, vessels will often meet with light, variable winds, rendering it impossible for them to preserve a straight course.

Macclesfield channel does not afford convenient objects as marks to keep vessels clear of danger, but the following have been taken from the American chart as being, so far as we are able to judge, the best that can be given for that purpose; as, however, some of the objects are at a considerable distance from the dangers, navigators are cautioned not to depend too implicitly upon having made out, or being able to make out, such distant objects, but rather to rely upon a more general exercise of judgment, paying attention to the soundings, frequently referring to the chart, &c. It is indispensable, that the greatest vigilance be observed, and careful regard had to the set of the tides and currents, in order to work a vessel safely through this dangerous channel.

Standing to the eastward,—a vessel having passed eastward of the Fairlie rock may stand on, keeping a good look-out, until she is about $2\frac{1}{2}$ miles from Sand island or one mile from Branding breakers, and will have from 13 to 7 fathoms water. Sand island is just awash at high water, and Shoal-water island, bearing N.N.E. $\frac{1}{2}$ E., leads a mile to the westward of the Branding breakers. Shoal-water island should not be approached nearer than 3 miles, on account of the one-fathom patch lying about 2 miles westward of it.

The Java Guide gives the following directions to clear the Vansittart shoals:—

“To avoid the Vansittart shoals, with a contrary wind do not bring Entrance point more to the westward than N.W. $\frac{1}{2}$ N. before the peak of Saddle island bears N.E. by E., or rather keep Leat island a little to the eastward of North. When near the north-west part of these shoals, the west end of Leat may be brought N. $\frac{1}{2}$ W., but not more westerly, until South island is open to the northward of Low and Saddle islands. The northern extremities of these two islands, and the southern part of South island in one E. by N. $\frac{3}{4}$ N., just clear the northern part of the shoals.”

It appears, however, by the American chart that Entrance point bearing N. W., and the peak of Saddle island N.E. $\frac{1}{2}$ E., will keep a vessel nearly $1\frac{1}{2}$ miles clear of the south-west prong of the shoals. Leat island a little eastward of North, seems rather an indefinite mark, unless it be

* Java Guide.

known how much of the island is visible, but, taking it to mean the highest point, viz. : Putat hill, 613 feet high, and which would appear from the southward nearly in the middle of the island—it should not be brought to the northward of N. $\frac{1}{2}$ E., until the peak of Saddle island bears N.E. $\frac{1}{2}$ E., when it may be brought to bear North. The north extremes of Saddle and Low islands in line, bearing N.E. by E. $\frac{3}{4}$ E., clears the northern end of the shoals nearly a mile.

Being to the northward of the Vansittart shoals, Low island must not be brought south of E. by S. $\frac{1}{2}$ S., or Sand island west of North, to avoid the shoals between those islands ; and to clear the patches lying southward of the south-east point of Pulo Leat, keep Barn island east of E.S.E., until Middle point, or Putat hill, bears N. by W. $\frac{1}{4}$ W., when Barn island may be brought to S.E. by E. $\frac{1}{2}$ E., which will clear the reef extending from Middle point. To clear the reefs south of Jelaka, the south-east point of Leat should not be shut in by Middle point, until Pulo Jelaka bears N.N.E. ; and to avoid the reefs westward of that islet, keep Middle point east of E.S.E., until Jelaka bears East. Jelaka bearing East also leads northward of the Discovery rocks.

Having arrived 2 miles West of Jelaka, and to the northward of the Discovery rocks, Entrance point must not be brought west of S.S.W. $\frac{1}{4}$ W., nor Klippige point west of S.W. $\frac{3}{4}$ S., until Pulo Kilapan bears W.S.W., which will lead outside the dangers extending from the north-west coast of Leat, and $1\frac{1}{2}$ miles to the northward of the Alceste reef. Rocky point hill in line with Tree point, S.W. $\frac{1}{4}$ S., leads about a mile north-westward of the Alceste reef.

Standing to the westward,—to avoid the $2\frac{1}{2}$ -fathoms bank, keep the high trees on Klippige or Rocky point, or Rocky point hill, well open of Entrance point, bearing N. by W. $\frac{1}{4}$ W., or keep Entrance point west of N. by W. $\frac{1}{2}$ W., until Baginda peak bears W. by N., when a vessel may stand over until Entrance point bears N. by E. $\frac{1}{2}$ E.

To clear the Klippige shoals, do not bring Entrance point south of S.W. $\frac{3}{4}$ S., until the right extreme of Pulo Kilapan bears N.W. by W. Klippige point, S.W. by W., or Pulo Jelaka N.E. by E., leads about half a mile northward of the Klippige shoals.

When standing towards the Discovery rocks, do not bring Entrance point south of S.S.W., or Klippige point south of S.W. $\frac{1}{2}$ S., until the right extreme of Kilapan bears W. by N. $\frac{1}{4}$ N., or Pulo Jelaka, West, when a vessel will be northward of the dangers and may stand westward towards the bank into 10, or even 8 or 7 fathoms, until she nears Wilson bank.

The Saddles, two hills on the Banka coast, 912 feet high, bearing W.N.W., or the Padang hills W. by N. $\frac{1}{4}$ N., lead about $1\frac{1}{4}$ miles south-

ward of the Wilson bank ; and the extreme of Brekat point, N.W. by N., leads more than half a mile eastward of that danger, and will also keep a vessel clear of the elbow when standing inshore between Wilson bank and Brekat point.

DIRECTIONS through MACCLESFIELD CHANNEL from the NORTHWARD.—In the early part of the N.E. monsoon, northerly and north-westerly winds prevail about the entrance of Gaspar strait, when strong south-easterly currents will generally be experienced between Gaspar island and Pulo Leat. It appears certain that the frequent accidents happening to vessels in the vicinity of Alceste reef, arise principally from neglecting to guard against the effects of this current. A vessel, therefore, intending to proceed to the southward through Macclesfield channel, and having passed a mile or two eastward of Gaspar island, should steer to the south-westward until Gaspar island bears N. by E. $\frac{1}{2}$ E., upon which bearing it should be kept until Pulo Kilapan is S.W. by W., and the north point of Pulo Leat, S.E. by E., when she will be in the fairway of the channel, and may steer South, carefully guarding against the effects of tides or currents by frequent cross bearings of the north point of Leat, Pulo Jelaka, Rocky point hill, or Pulo Kilapan. If a South course be preserved, when Pulo Kilapan bears West, Middle point, the south-west point of Leat, will be the breadth of Jelaka open of that islet, and Klippige point will bear S.W. by S., which latter bearing also leads *close* to the east side of the Discovery rocks. If, when Pulo Kilapan bears West, Middle point be not open of Jelaka, the vessel will be too far to the eastward ; and if Middle point should be more than the breadth of Jelaka open of that islet, she will be too far to the westward.

If, in consequence of light or baffling winds, it be found impossible to keep Gaspar island N. by E. $\frac{1}{2}$ E., but that as the vessel approaches Pulo Leat it is found to bear N. by E., or N. $\frac{3}{4}$ E., great caution must be observed in passing Alceste reef, for Gaspar island bearing N. $\frac{1}{2}$ E. is the line of direction of that danger, and to avoid it Pulo Kilapan must not be brought westward of W.S.W., until Pulo Jelaka bears South.

Being in the fairway, with Pulo Kilapan bearing West, and Middle point the breadth of Jelaka open of that islet, Entrance point will be just in sight, bearing about S.S.W. A ship may continue the South course, but if there be any doubt of her position, it will be prudent to bring Entrance point S.S.W. $\frac{1}{4}$ W., which will lead through nearly in mid-channel between the Discovery rocks and the dangers off Jelaka, the narrowest and most difficult part of the channel. But great care must be taken to preserve that bearing, Entrance point being at so great a distance, that any error in the bearing would be extremely likely to lead

into danger. Entrance point bearing S.S.W. $\frac{1}{2}$ W., leads about half a mile westward of the dangers off Jelaka, and the same point S.S.W., leads clear of the Discovery rocks.

When the south-east point of Leat is open of Middle point, the ship will be southward of the Discovery rocks, and if she has been steering for Entrance point, the course must be immediately altered to the south-eastward, until Entrance point bears S.W. $\frac{1}{2}$ S.—which leads eastward of the Klippige shoals—when a South course may be again shaped until Entrance point bears about W. $\frac{1}{2}$ S.; then steer S. $\frac{1}{2}$ W. for 13 or 14 miles, or until Entrance point is about N. by W. $\frac{1}{4}$ W., and Baginda peak N.W. $\frac{3}{4}$ W., when the vessel will be in about 10 fathoms on the outer edge of the bank extending northward of the Mateu Blas rock, and to clear that rock must steer about S.W. until the Six peak range of hills on Pulo Lepar bears N. by W.; when a S. by W. $\frac{1}{2}$ W. or S.S.W. course may be shaped for the Two Brothers.

To Work through from the Northward, it will generally be advisable to get over to the westward towards the Banka shore as soon as possible, where a vessel will be more in the fairway of the channel, and will find more convenient depths of water for anchoring if it should be necessary to bring up.

If, however, when to the southward of Gaspar island, it should be found advantageous to stand well over to the eastward, it is not advisable that Gaspar should be brought more westward than N. by W. or N. by W. $\frac{1}{4}$ W., when nearing the doubtful position of the Akbar shoal; and the greatest care should be observed in rounding Alceste reef, not to bring Pulo Kilapan westward of W.S.W. until Pulo Jelaka bears South.

Standing to the westward,—Tree island may be approached to about a mile, or until Gaspar island bears N.E. $\frac{3}{4}$ E., which leads that distance clear of the dangers extending from it. Brekat point bearing N.W. by N., will lead about half a mile eastward of the Elbow and of Wilson bank, and a vessel will be to the southward of those dangers when the Saddles, on Banka, bear W.N.W., or Padang hills W. by N. $\frac{1}{4}$ N., and may then stand on to the bank into 8 or 7 fathoms, until the north extreme of Pulo Kilapan bears W. by N. $\frac{1}{4}$ N., which leads northward of the Discovery rocks. Klippige or Rocky point, S.W. $\frac{1}{2}$ S., leads eastward of the Discovery rocks, and also clears the shoals extending from the north-west coast of Pulo Leat.

Standing to the eastward towards Jelaka, take great care not to bring Entrance point anything west of S.S.W. $\frac{1}{2}$ W. until Middle point is E.S.E., which leads southward of the dangers off Jelaka. Jelaka must then be kept east of N.N.E., until the south-east point of Leat is in line

with Middle point, when it may be brought to bear North. To avoid the rocks off the south-east point of Leat, do not bring Putat hill, or Middle point, west of N. by W. $\frac{1}{4}$ W., until Barn island bears E.S.E. The east extreme of Pulo Leat bearing North will keep a vessel clear of the dangers extending from Sand island; and Sand island, if not brought to the west of N. $\frac{1}{4}$ W., will clear the dangers to the southward of it and of Barn island. Saddle island in one with Low island, bearing E.N.E., leads about three-quarters of a mile northward of the northern group of the Vansittart shoals; Putat hill bearing North, or N. $\frac{1}{4}$ W., leads westward of the middle group; the same hill N. $\frac{1}{2}$ E. leads westward, and Entrance point N.W. to the southward of the south-west group. Shoal-water island should not be approached from the westward nearer than 4 or 3 miles; bearing N.N.E. $\frac{1}{2}$ E. it will lead a mile westward of the Branding breakers.

The Padang, Turtle, and Hancock shoals may be approached to a mile, if a good look-out is kept when in their vicinity.

Standing to the westward when southward of the Discovery rocks, the right extreme of Pulo Kilapan bearing N.W. $\frac{3}{4}$ W., or Entrance point S.S.W. $\frac{1}{2}$ W., clears the northern cluster of the Klippige shoals; but when Klippige point bears West, Entrance point should not be brought south of S.W. $\frac{1}{2}$ S.. After passing Entrance point keep the high trees on Klippige point, or Rocky point hill, open of Entrance point, or keep Entrance point west of N. by W. $\frac{1}{2}$ W., until Baginda peak bears W.N.W., to clear the $2\frac{1}{2}$ -fathoms bank.

CLEMENTS CHANNEL.

This channel is much narrower and more encumbered with dangers than either the Macclesfield or Stolze channels. It is separated from the former by the four small islands, which from their appearance are respectively named Low, Saddle, Sand, and Barn, and by Pulo Leat, which form its western limit. To the eastward, it is only separated from Stolze channel by South, North, and Table islands, three small islands lying close together, so that the entrances to both channels, either from the southward or the northward, are common. The entrance to Clements channel from the southward is, however, understood to lie to the westward of the Doubtful dangers (page 99), Hancock and Turtle shoals, Sand island, Branding breakers, Shoal-water island, Embleton rock, and the Bliss Mateu shoal; whilst the entrance of Stolze channel is considered to be to the eastward of those dangers; and this order will be observed in the description of these channels.

LOW and SADDLE are two small islands, a little more than half a mile in diameter, lying in a S.E. by S. direction about $8\frac{1}{4}$ miles from the south-eastern point of Pulo Leat. They bear E.N.E. and W.S.W., and are distant a mile from each other. Low island, the westernmost, is 123 feet high; Saddle island has two hills upon it forming a saddle, the western hill being 210, and the eastern 266 feet high. Both islands are connected and surrounded by reefs, extending nearly half a mile from them.

Dangerous Reefs.—Three dangerous patches, extending a mile in a north-west and opposite direction, lie between the bearings of E. $\frac{1}{2}$ N. and N.E. by N., distant $1\frac{1}{4}$ miles from the east point of Saddle island. In the Java Guide a dry reef is said to lie $1\frac{1}{4}$ miles N.E. by E. from Saddle island, but in the American survey one fathom water is shown on the south-east and north-west patches, and 2 fathoms on the middle patch. Between the reefs and the island is a narrow channel of 8 to 14 fathoms water; close to, on the outside of the reefs, are 15 to 19 fathoms.

SAND ISLAND, lying S. by E. $\frac{3}{4}$ E. 5 miles from the south-east point of Pulo Leat, is very small and low, and surrounded by rocks to the distance of a third of a mile. About half a mile to the northward of it are 12 or 14 fathoms, and from 13 to 23 fathoms the same distance to the southward.

BARN ISLAND, lying about $1\frac{1}{2}$ miles E. by N. $\frac{1}{2}$ N. from Sand island, is small, about a third of a mile in diameter, 154 feet high, and surrounded by a reef to the distance of about a third of a mile. Between Barn and Sand islands are depths of 8 to 14 fathoms.

Dangerous Reefs, dry at low water, extend nearly 2 miles between the bearings of S.S.E. $\frac{1}{4}$ E. and S.S.W. $\frac{1}{4}$ W. from Barn island.

SOUTH ISLAND, one of the islands limiting Clements channel to the eastward, lies S.E. by E. $\frac{1}{2}$ E. $10\frac{1}{4}$ miles from the south-east point of Pulo Leat. It is the largest of the islands in this vicinity, being about a mile in diameter; the highest hill upon it is 200 feet high. It is surrounded by a reef extending from it in most parts about a third of a mile, but off its south end dangers project three-quarters of a mile. Close to the reef are from 5 to 14 fathoms, and 18 and 24 fathoms a short distance to the westward.

TABLE ISLAND, lying E. by S. $1\frac{3}{4}$ miles from South island, more properly belongs to Stolze channel. It is surrounded by reefs projecting nearly half a mile from it, and in the middle of the channel between it and South island, is a $2\frac{1}{4}$ -fathoms patch.

NORTH ISLAND, lying $1\frac{1}{4}$ miles northward of South island, is also surrounded by a reef, which extends from it about a third of a

mile. At two-thirds of a mile E.N.E. from the east end of the island is a dry bank with 16 fathoms close to, and 12 fathoms between it and the reef extending from the island; a mile S.E. from the same end of the island is a patch of 3 fathoms. Close to the reef projecting from the west side are 5 to 9 fathoms, and 22 or 23 fathoms at a short distance from it, between it and the Sunk rock.

SUNK ROCK is described in the Java Guide, page 312, as being 16 yards only in diameter, with 9 feet water on it, and 10 fathoms around it. From it Saddle island bears S. by W. $\frac{1}{4}$ W. $4\frac{3}{4}$ miles, North island E. by N. $2\frac{1}{4}$ miles, Barn island W. by S. $3\frac{1}{4}$ miles, a reef near Saddle island South, the centre of Table island and the north point of South island are in one, and Sandy island is entirely hidden by Barn island.

From its position as placed upon the American chart, the southern extreme of North island bears West, distant $2\frac{1}{2}$ miles; the south-western extreme of South island S.E. by E.-southerly; and the northern point of Barn island W. by S.-southerly. A quarter of a mile S. $\frac{1}{4}$ E. from it is a patch of 5 fathoms, with 13 fathoms between it and the rock.

MIDDLE PASS SHOALS are three coral patches lying close together, and extending nearly a mile in a N.E. by N. and opposite direction. From their southern extreme Barn island bears S. $\frac{3}{4}$ E. 3 miles; and the south-eastern point of Pulo Leat bears N.E. by E. $\frac{3}{4}$ E. $2\frac{3}{4}$ miles. Barn island, bearing S. $\frac{3}{4}$ W., leads about two-thirds of a mile to the eastward of the shoals; the southern extreme of North island S.E. by E., clears them about the same distance to the north-eastward, and bearing E. by S. $\frac{1}{4}$ S., clears them to the southward; the south-east point of Pulo Leat bearing W. $\frac{1}{4}$ S., clears them to the northward.

CORAL BANK is a small patch just awash, with 12 to 19 fathoms around it, lying $1\frac{1}{2}$ miles north-westward of the Middle Pass shoals. From it the south-east point of Pulo Leat bears S.W. by W. $\frac{1}{2}$ W., nearly $1\frac{1}{4}$ miles; and Pulo Anak N. by W. $\frac{3}{4}$ W.-westerly, $2\frac{3}{4}$ miles. The south-east point of Leat, bearing E. by S. $\frac{1}{2}$ S., leads to the southward of the bank; and the eastern extreme of Pulo Anak, N.W. by N., leads to the north-eastward.

HEWITT SHOAL, upon which, in August 1820, the ship *General Hewitt* struck and remained fast for half an hour, lies 5 miles N. by W. $\frac{1}{4}$ W. from the western extreme of North island. When aground the western extremes of South and North islands were in one; the extremes of Leat island bore from W.N.W. to W. by S. $\frac{1}{4}$ S.; Barn island S.W. by S.; and the hill on Brekat point was well open of Pulo Leat. It is about a ship's length in extent, and 16 to 20 yards in breadth. The coral rocks

were visible under the vessel with only 14* feet water over them, and near the shoal 12 to 15 fathoms.

The high part of South island open of the west extreme of North island leads westward of Hewitt rock; and the same object open of the east extreme of North island leads to the eastward.

PULO LEAT.—The western coast of this island is noticed at page 107. The eastern coast takes a northerly direction for $3\frac{1}{4}$ miles from its south-east point, when it runs about N.W. $\frac{1}{2}$ N. $3\frac{1}{2}$ miles to the northern point. The whole of this coast is fronted by a coral reef, which commences about half a mile northward of the south-east point; in front of the bay about three-quarters of a mile northward of the south-east point, the reef extends half a mile, but not quite so far from the eastern extreme of the island. Close to the northward of the eastern extreme, upon the dry reef extending from the shore of the island, is an islet called Pulo Anak, or Selagin.

Water.—According to the American chart, fresh water may be obtained in the small bay, about half a mile to the northward of the south-east point of Leat, just where the dry reef begins to project from the shore.

Off the north-east coast of Pulo Leat, besides the reef projecting from the shore, are numerous out-lying coral patches extending nearly 2 miles from it, and rendering this part of the coast exceedingly dangerous. The north-eastern of these dangers,—which bound this part of Clements channel to the westward,—lies with the south-east point of Leat in line with the eastern extreme of the island, distant nearly 2 miles from Pulo Anak; from whence the dangers take a S. $\frac{3}{4}$ W. direction until they join the reef which projects about half a mile East of Pulo Anak.

A vessel will pass eastward of these dangers by keeping the south-east point of Leat west of S. by W. $\frac{3}{4}$ W.; and North island bearing S.E. $\frac{3}{4}$ S. will lead to the north-eastward.

AKBAR SHOAL is noticed in page 110.

The **MIDDLE PASS**, which unites Macclesfield and Clements channels, is bounded on the south-east by Sand island, Barn island, Sunk rock, and North island; and on the north-west by the dangers projecting from the southern end of Pulo Leat and the Middle Pass shoals.

To proceed from the Macclesfield channel through the Middle pass from the south-westward, steer between Entrance point and the Vansittart shoals towards Sand island, the channel between which and the shoals extending from the southern end of Leat, is clear, with depths of 14 to 20 fathoms; Entrance point kept bearing W. by S. $\frac{3}{4}$ S., will lead through in mid-channel.

* The American chart shows 18 feet water.

In the event of meeting with baffling winds, so that the vessel cannot preserve a straight course, the following may prove useful:—The east extreme of Pulo Leat bearing North, clears the dangers extending from the west side of Sand island; the north extreme of Barn island bearing East, clears the dangers extending from the north side of Sand island; Barn island E.S.E. clears the shoals projecting from the southern end of Leat; Middle point of Leat W.N.W., clears the Middle Pass shoals; and the north extreme of Barn island S.W. by W. $\frac{3}{4}$ W. leads north of Sunk rock.

The **CHANNEL** between **LOW ISLAND** and **SAND ISLAND** is narrowed to the breadth of $1\frac{1}{2}$ miles by the shoals extending to the southward of Barn island. It is not easy to see what advantage is to be gained by using this channel, but in the event of a vessel wishing to proceed by it, she may do so in safety with North island bearing N.E. by E., which will lead her through in mid-channel in 20 fathoms water, and when the west extreme of Saddle island bears S.S.E., which leads eastward of the shoals south of Barn island, a course may be shaped to the northward.

The **CHANNEL** between **VANSITTART SHOALS** and **LOW ISLAND** is 2 miles wide, and may be used by bringing Sand island to bear N.N.W., which will lead through in mid-channel. As the north-eastern prong of the Vansittart shoals is approached, take care that Sand island is not brought at all to the northward of N. by W., when the south point of Saddle island comes in one with the north point of South island. The dangers extending from Low island will be avoided if Sand island is not brought west of N.N.W. $\frac{1}{2}$ W.

DIRECTIONS through **CLEMENTS CHANNEL** from the **SOUTHWARD**.—Proceeding through Clements channel from the southward, having passed the Fairlie rock, steer about N. by E. or N. by E. $\frac{1}{2}$ E., if the vessel has passed on the south side of the rock, or about N.E. by N. if she passed on the north side. When the summit of South island is made out, bring it N.N.E., which will lead between the Embleton rock and the Vansittart shoals; take care however not to mistake South island, remembering that Low and Saddle islands will be seen to the westward of it. Low island bearing N.N.E. leads over the south-eastern prong of the Vansittart shoals.

Approaching South island on a N.N.E. bearing, the soundings will be 9 to 13 fathoms until well up with Low island, when they will deepen to 16 and 18 fathoms, and to 24 or 25 fathoms when abreast of Saddle island. When Saddle island bears West, steer N. by W., which will lead more than a mile clear of the reefs off the north-eastern end of Saddle island, and midway between North island and Sunk rock, and in this

track the soundings will be 22, 24, 17, 24, and 23 fathoms. When the north extreme of North island bears East, steer N.W. by N. for 5 or 6 miles to pass between Middle Pass shoals and Hewitt shoal, in depths varying from 22 to 32 fathoms; when the south-east point of Leat bears about W.S.W., a N. $\frac{3}{4}$ W. course may be shaped for Gaspar island.

To pass westward of Sunk rock, keep the summit of South island N.N.E., until Saddle island bears W. by S., when steer N.W. $\frac{1}{2}$ W., which will lead clear of the shoals north-eastward of Saddle island, and between Sunk rock and Barn island. Saddle island S. $\frac{1}{2}$ E. leads midway between Barn island and Sunk rock, and between Middle Pass shoals and Hewitt shoal.

Working through.—No vessel would from choice attempt to work through Clements channel, as Macclesfield and Stolze channels are much better adapted for that purpose; but it is possible that a vessel, embarrassed by light baffling winds, may find it convenient to proceed through some part of this channel, and it is with this view that the following directions are given.

Directions have been already given (at page 113) for passing westward of the Fairlie rock. To clear the south-eastern prong of the Vansittart shoals, do not bring South island east of N.E. by N. nor Low island east of N. by E. $\frac{1}{2}$ E. When the highest of the hills on Pulo Lepar—seen left of Entrance point—bear W.N.W., a vessel will be northward of the south-eastern prong, and may stand on until Low island bears N.N.E. $\frac{1}{2}$ E., which leads eastward of the middle and northern patches. Standing towards Low and Saddle islands, keep the south-east extreme of South island north of N.E. To clear the southern and eastern sides of the shoals lying off the north-east end of Saddle island, do not bring the south point of Saddle island south of West, nor the west extreme of North island east of N. by E. $\frac{1}{2}$ E.; the north point of Barn island, if not brought north of N.W. by W. $\frac{3}{4}$ W. will clear them to the north-eastward; the south point of South island bearing E. $\frac{1}{2}$ N. clears them to the northward; and the eastern extreme of Saddle island bearing South clears them to the westward.

When standing towards the shoal patches, extending southward from South island, keep the west extreme of North island open of the west extreme of South island, bearing North. As South island is neared, the west extreme of North island must not be brought north of N. $\frac{3}{4}$ E., to clear the dangers extending a short distance from South island. As North island is approached, the west extreme of South island not brought to the south of S. by E. $\frac{3}{4}$ E., will clear the dangers extending from North island. The south-west extreme of South island bearing S.E. leads north-eastward of the Sunk rock; and bearing E.S.E. leads south-

westward ; the east end of Saddle island S. by W. $\frac{1}{2}$ W. leads eastward of the rock, and bearing South leads westward.

Standing towards the shoals extending southward of Barn island, the west end of Low island must not be brought eastward of South. Barn island S. $\frac{3}{4}$ W. leads eastward of the Middle Pass shoals ; and the peak of South island S.E. $\frac{1}{4}$ E. leads north-eastward of them, and of the Coral bank. The peak of South island open of North island S.S.E. $\frac{1}{4}$ E. or S.S.E. $\frac{1}{2}$ E., leads westward of the Hewitt shoal ; and the eastern extreme of South island *just* open of the eastern extreme of North island, leads to the eastward. In standing towards Pulo Leat, when a mile or two northward of the Coral bank, the south-east point of Leat should not be brought south of S.S.W. $\frac{1}{4}$ W., to avoid the dangers extending from the shore. The north-eastern coast of Leat must not be approached nearer than 3 or 4 miles ; North island bearing S.E. by S. will lead north-eastward of the dangers projecting from that coast, as will also the hill on Brekat point, bearing N.W. by W.

DIRECTIONS through CLEMENTS CHANNEL from the NORTHWARD.—For the convenience of navigators, the directions for proceeding through this channel from the southward, with a fair wind, are here reversed ; but, for working through, it will not be necessary to give other directions than those just given, which are, in fact, merely the bearings of objects to avoid the various dangers, and equally apply to vessels proceeding in either direction.

Having passed a mile or two eastward of Gaspar island, steer to bring it N. by W., and kept on that bearing steering S. by E. it will lead clear of the dangers lying off the north-east coast of Pulo Leat. When the north extreme of Pulo Leat bears West, its south-east extreme should bear S.W. by S. Continue the S. by E. course until the south-east extreme of Leat bears W.S.W., when Saddle island should be seen just on the star-board bow with Barn island and Low island to the right of it ; South island should be about two points on the port bow with North island close to the left of it. The west extreme of South island, S.E. by S., will lead between Sunk rock and the dangers extending from North island. When the north point of North island bears East, steer S. by E. to pass between South island and the shoals off the north-east end of Saddle island ; and when the south extreme of Saddle island bears West, bring the peak of South island N.N.E., and keeping it on that bearing will lead between Embleton rock and the Vansittart shoals.

If intending to pass westward of Sunk rock, preserve the S. by E. course until the south-east extreme of Leat bears West, when Saddle should bear or must be brought to bear S. $\frac{1}{2}$ E., which leads between Sunk rock and Barn island. When North island bears E. $\frac{1}{2}$ N., steer

S.E., taking care that the north end of Barn island is not brought to the north of N.W. by W. $\frac{3}{4}$ W., to clear the dangers north-eastward of Saddle island; when the peak of South island bears N.N.E., steer S.S.W., and proceed as before.

STOLZE CHANNEL.

Stolze channel is rather wider, less encumbered with dangers, and furnishes objects more convenient for guiding vessels safely through it, than the Macclesfield channel. The southern entrance is 15 miles broad, bounded on the west by the Larabe shoal, and the dangers described in page 100, and on the east by the Carnbee rocks, Anvangs bank, Cooper, and Three-feet shoals. These latter shoals are very much against this channel in making it from the southward, for the Carnbee rocks—the most southern of the dangers—are 20 miles distant from the land, so that in thick or hazy weather, when a ship might be uncertain of her exact position, she would not be able to make Billiton with nearly the same safety that she would be able to make Pulo Lepar or the south coast of Banka. These shoals would appear to form the only drawback to the adoption of this channel, and in fine weather, even this would almost disappear, for the hills on Billiton are high, and may be seen at a distance of 30 or 35 miles. Upon the American chart is a view taken from a position near the Carnbee rocks, from which it appears that when in the vicinity of these dangers, not only are the hills on Billiton clearly distinguishable, but Kennedy and Otan islands are well in sight.

CARNBEE ROCKS, in lat. $3^{\circ} 34\frac{1}{2}'$ S., long. $107^{\circ} 42\frac{1}{4}'$ E., are awash at high water; around them are from 7 to 13 fathoms of water.

ANVANGS BANK, discovered in 1822 by Lieut. J. Stolze, is half a mile in length W. by N. $\frac{1}{2}$ N. and E. by S. $\frac{1}{2}$ S., and about a cable broad. It consists of large black rocks, some of which are visible at low water springs; close to them are 5 to 13 fathoms, and about $1\frac{1}{2}$ miles westward of them are 22 fathoms. From the western extreme of the bank, Gunong Bolo, on the south point of Pulo Selio, bears N.N.W. $\frac{3}{4}$ W. $10\frac{1}{2}$ miles, and Blantoe hill N. by E. $\frac{1}{2}$ E.

A rock above water, named Karang Naga, is marked on the Dutch chart for 1863, at $3\frac{1}{2}$ miles S.S.E. of the Anvangs bank.

COOPER SHOALS, lying N.N.W. $\frac{1}{4}$ W. $2\frac{1}{2}$ miles from Anvangs bank, have only 2 feet water over them, and 7 to 10 fathoms close to. Gunong Bolo bears from them about N.W. by N., and Blantoe hill N.N.E.

THREE-FEET SHOAL is a patch having only 3 feet water over it and 10 to 13 fathoms around it, lying N.W. by W. $\frac{1}{4}$ W. $4\frac{1}{2}$ miles from

Cooper shoals, with Gunong Bolo bearing N. $\frac{1}{2}$ W. $4\frac{1}{2}$ miles, and Blantoe hill N.E. $\frac{1}{4}$ N. $13\frac{1}{4}$ miles.

KENNEDY and OTAN ISLANDS.—Kennedy is a small island, lying 7 miles to the north-east of the Anvangs bank, in lat. $3^{\circ} 20\frac{1}{2}'$ S., long. $107^{\circ} 43' 50''$ E. There is a small islet at three-quarters of a mile to the north-west of it.

Otan is rather smaller than Kennedy island, and lies about $1\frac{1}{4}$ miles E.S.E. from it.

Other dangers and islands lie to the southward of Billiton, but as they are to the eastward of the track of vessels bound through Gaspar strait, they are included in the description of Carimata strait (page 154).

THE WEST COAST of BILLITON, forming the eastern limit of Gaspar strait, is fronted by numerous islands, separated by narrow, and for the most part, unnavigable passages. Pulo Selio, with the dangers westward of it; the group named the Six islands; and Pulo Mendanao, the largest of the islands, form the eastern limit of Stolze channel.

Hills on the Coast.—At the south-west end of Billiton are the Haycocks, two remarkable hills, 496 feet high, which when coming from the southward, appear as islands. Five miles north-eastward of the Haycocks is Blantoe hill, 1,166 feet high; and to the eastward of Blantoe are Luda, Pyramid, and South peak, all of which serve to determine a ship's position when approaching the strait from the southward.

Seven miles northward of Blantoe are Kliang, 1,198 feet, and Nose 1,090 feet high. Ten or eleven miles N. by E. from Blantoe, is Agong, 1,242 feet high, and which appears to be the highest hill on the island. Seven miles northward of Agong, in lat. $2^{\circ} 53'$, is Tadjem, 1,096 feet high. The whole of the hills just mentioned are visible from the southward and south-westward. Three miles S.S.E. $\frac{1}{2}$ E., from Tanjong Bienga, a high bluff forming the north-western extremity of Billiton, is Gunong Tebalo, the highest part of which, Round Mount, is 541 feet high.

PULO SELIO is surrounded by a reef, and separated from the south-western point of Billiton by a narrow channel in the middle of which is the small island of Sariboe; a mile south-eastward of Sariboe is a reef which partly dries. Close to the shore of Billiton are the small islands Goenting and Proet.

The south point of Selio is in lat. $3^{\circ} 15' 30''$ S., long. $137^{\circ} 32' 40''$ E., and the conspicuous hill, 242 feet high, upon it is named Gunong Bolo.

WHITE ROCK, 28 feet above water, stands on the outer edge of a rocky patch, lying nearly 3 miles W. $\frac{1}{4}$ N. from the south point of Selio; a mile S.E. by E. from it are some rocks above water. There is no channel between White rock and Selio, and shoal water extends nearly $1\frac{1}{2}$ miles southward of that island.

A SHOAL, about a third of a mile in extent, having but $1\frac{1}{2}$ feet of water over it, and 10 to 16 fathoms close to, lies N.W. nearly 2 miles from White rock. Between this shoal and White rock, and between both and the Koerier bank are channels of 5 to 8 fathoms water.

KOERIER BANK, of sand, about a mile long and a quarter of a mile broad, dries at low water at 3 miles North of the White rock, and 4 miles West of the north point of Pulo Selio.

WATER.—A little to the northward of Tamelang point, on the south-west side of Billiton, there is a small rivulet of good water, which may be easily approached by boats.

Fresh water is also to be found in the northern part of the bay on the west side of Selio.

ANCHORAGE.—The 3-fathoms edge of the bank surrounding Selio forms a sort of bay on the west side of that island, where a ship may anchor to fill up water. The entrance to it is between the $1\frac{1}{2}$ -foot shoal and the Koerier bank; Gunong Bolo bearing S.E. by E. $\frac{1}{2}$ E., will lead into it, midway between those dangers. The anchorage nearest to the watering place, is in 6 or 7 fathoms, bottom of sand and shells, with White rock bearing S.W. $\frac{1}{2}$ S., and the south extreme of Selio, S.E.; no vessel should venture farther in. If an anchorage farther out should be preferred, it may be taken anywhere with White rock bearing from S. by E. to S.W. $\frac{1}{2}$ S.; and the south extreme of Selio from E.S.E. to S.E. by E.

In entering or leaving the bay take care not to bring the south extreme of Selio east of E.S.E., as that bearing only just clears the $1\frac{1}{2}$ -foot shoal, and the same point must not be brought south of S.E. $\frac{1}{2}$ E., to avoid the Koerier shoal.

FOUL GROUND and SHALLOW WATER extends to the westward from Billiton nearly to a line drawn from White rock to Ross island, the most southern of the Six island group; within this line, $2\frac{1}{2}$ miles N. by W. $\frac{1}{2}$ W. from the Koerier bank, is Gull rock.

The large bay to the northward of Selio, and eastward of the Six islands, is crowded with small islands and reefs; most of the latter, as far as Roe point, dry at low water, and the pilots who were accustomed to these shores refused to go in there even with the boats.*

The SIX ISLANDS, called Pulo Lima by the natives, are small, low, and surrounded by reefs, between which are narrow passages having depths of 10 to 20 fathoms water. The southernmost of these islands,

* Java Guide, page 313.

named 'Ross, after Captain Ross, I.N., is 42 feet high, and lies in lat. $8^{\circ} 51'$ S., long. $107^{\circ} 23'$ E. The others are named Benolo, 94 feet high; Kasenga, 58 feet; Bago, 146 feet; Betong, 170 feet; and Binget, 158 feet high. They may be approached to the southward and westward as near as one mile; but dangerous patches extend from Ross island in a south-east direction for nearly 2 miles; and from Kasenga, the north-western island, reefs, some of which dry at low water, extend in a N.N.W. direction to the distance of $1\frac{1}{4}$ miles, and for three-quarters of a mile in a southerly direction. The western extreme of Mindanao bearing North a little easterly, leads *close* to the reef extending N.N.W. from Kasenga, and bearing N. $\frac{1}{4}$ E. or N. $\frac{3}{4}$ E., clears all dangers near the Six islands.

TABLE ISLAND, 116 feet high, forms the western limit of the narrowest part of Stolze channel, the reef extending N.N.W. from Kasenga, forming the eastern limit. The island is about a third of a mile long N.N.W. and S.S.E., and nearly a quarter of a mile broad. It lies nearly 2 miles E. by S. from South island, and, from its isolated position, serves as an excellent mark to guide vessels in steering for the narrow part of Stolze channel when approaching it either from the southward or from the northward. It is surrounded by a reef to the distance of nearly half a mile, and at two-thirds of a mile S.W. of it is an outlying patch of 3 fathoms.

SOUTH ISLAND is about four times as large as Table island, and a hill on its northern part is 200 feet high. It is bordered by a reef, and dangers extend three-quarters of a mile in a southerly direction from its south point. On its north side are some rocks not far from the shore, and a patch with only 3 feet water over it lies half a mile N. by W. from its eastern point.

A $2\frac{1}{2}$ -Fathoms Patch lies nearly in mid-channel between Table island and South island, which makes that passage dangerous; elsewhere are soundings of 14 to 21 fathoms.

NORTH ISLAND, 240 feet high, is separated from South island by a channel $1\frac{1}{2}$ miles wide, which, from the reefs projecting from both islands, is narrowed to three-quarters of a mile. The channel is clear, with soundings of 7 to 18 fathoms. The two islands are in one on a N. by W. and opposite bearing, but North island is the smaller of the two. Reefs and rocks extend about a third of a mile off the southern side of North island, and the same distance off its north-eastern point. Three-quarters of a mile E.N.E. from the north-east point, is a dry patch; there is also a patch of 3 fathoms lying S.E. $\frac{1}{4}$ E., distant a little more than half a mile from the same point.

PULO MENDANAO, or Long island, lying $15\frac{1}{2}$ miles to the eastward of Pulo Leat, is much the largest of the numerous islands which front the west coast of Billiton. It is about 8 miles in extent north and south, and about the same distance east and west, so that Long island does not correctly designate its shape, but it is probable that Pulo Gala to the southward, and Pulo Batu Dinding to the northward, were formerly supposed to be a part of it, and from this cause it may have obtained its name. The island is for the most part low, but has some hills 600 to 700 feet high upon it. Its western extreme, named West point, projects considerably from the main body of the island, and there is a small hill near its extremity.

PULO AYAM, is a very small islet, lying S.S.E. $2\frac{1}{2}$ miles from West point.

There is a rock on the outer edge of the reef extending from Mendanao, from which the south point of the island bears E. $\frac{1}{2}$ S. $2\frac{3}{4}$ miles, and Pulo Ayam N.N.W. $\frac{3}{4}$ W. At three-quarters of a mile from the rock in the direction of Pulo Ayam is a dry patch.

PULO GALA, or Low island, lies off the south-east coast of Mendanao, from which it is separated by the Nado passage, about three-quarters of a mile broad.

Sikindang island, La island, and Hoorn island, are small islands lying between the east coast of Mendanao and Billiton. Hoorn island is connected to Mendanao by a reef.

THE NADO PASSAGE, between Mendanao and Gala islands, is said to be (page 314 of the Java Guide) entirely clear, and very deep. The American survey of 1854 also shows the channel to be clear—but in the Dutch chart for 1863, both the channel and its southern entrance is completely barred by rocks.

BROWN REEF—The English barque *Victor*, when proceeding through Stolze channel, struck on a rock with only 8 feet water on it, and 14 fathoms close-to, Pulo Betong (the easternmost of the Six islands) bearing S.S.E., and Table island W. $\frac{1}{2}$ S. These bearings would place this reef near the position of a danger named Brown reef on the Dutch chart.

CAUTION.—As there appear to be other dangers besides Brown reef in this locality, a vessel will do well not to pass eastward of a line drawn between Kasenga island and the West point of Mendanao.

KOOG ISLAND, or Pulo Kumbong, is a small islet, 100 feet high, and in the form of a sugar loaf, lying nearly $1\frac{1}{2}$ miles to the northward of West point; a reef surrounds it, which on the eastern and northern sides projects nearly half a mile.

PULO BATOE DINDING lies off the north coast of Mendanao, from which it is separated by the Nassi channel three-quarters of a mile broad. On the western side of the island is a deep bay, but it is quite filled up with coral shoals. Half a mile off the north-eastern end of the island is a small round islet.

The Nassi channel is navigable for small vessels only, owing to its being barred at either end; on the bar there are but 2 fathoms water, in the rest of the channel 5 to 9 fathoms.

ROTTERDAM ISLAND, lying about $1\frac{1}{2}$ miles northward of the south-west point of Batoe Dinding, is small, and more than half a mile west of it is a very small islet, half a mile south-west of which are some rocks. A bank of sand and rocks surround both island and islet, between which and the reef extending from Batoe Dinding is a narrow channel with 6 to 9 fathoms water in it.

CAUTION.—The whole coast between Mendanao island and Tanjong Bienga, the north-west point of Billiton, is fronted by dangers, and vessels should use extreme caution in approaching it; the outlying dangers only will be described.

KARANG SELAT, or Perlak shoal, is a rock nearly awash, with a 2-fathoms patch about a third of a mile north-eastward of it. From the rock the two north points of Batoe Dinding are in line, bearing W. $\frac{1}{4}$ S., the eastern extreme of Hoorn island bears S. by E. $\frac{1}{4}$ E., and Pulo Kalmanbang E. $\frac{1}{4}$ N.

PULO KALMANBANG is a small island lying E. $\frac{1}{4}$ N. $6\frac{1}{2}$ miles from the north-east point of Batoe Dinding. It is surrounded by an extensive reef, and just outside the edge of this reef, at half a mile from the western shore of the island, is a rock.

An extensive shoal, named Pinang, lies off the south and south-east sides of Kalmanbang, distant $1\frac{1}{2}$ miles from it; and there is another named Toekoel, to the north-westward of the island, the outer edge of which is distant from it $1\frac{1}{2}$ miles. Rocks lie off the north-eastern end of this latter shoal, the outer rock being nearly 2 miles distant from Kalmanbang.

TIERONTIONP BAY and RIVER.—This bay is to the northward of Kalmanbang island and the Toekel shoal, between the latter and the Karang Panjang or Bakka shoal. The river falls into the eastern part of the bay, but reefs extend off its entrance to a distance of nearly 4 miles. The small island of Kalmoa, 150 feet high, lies directly off the entrance, 3 miles within the reefs.

The outer edges of the reefs which lie on either side of the entrance of the river form a sort of bight, within the horns of which a vessel may anchor in 6 or 7 fathoms. The best anchorage appears to be a

little farther out, with Kalmoa island bearing about E.S.E., and Kalmanbang island S. by W. $\frac{1}{2}$ W.

The Java Guide, however, states that "The bay of Tieroetioep affords no safe anchorage in the N.W. monsoon, and even during the N.E. monsoon there are heavy gales from the north-west. It is advisable to lay the kedge out to the northward, as vessels often foul their anchors, either by the currents or winds. To enter and anchor in this bay, having passed the West point of Mendanao at a distance of 2 miles, steer North or N. by E, till Rotterdam island, or the north-west point of Dinding, bears S.S.E., then steer N.E. by E., E.N.E., or E. by N., till Kalmoa island bears S.E. by E.; steer then direct for that island till Kalmanbang bears S.S.W. $\frac{3}{4}$ W., and anchor in $7\frac{1}{2}$ fathoms with the mouth of the river S.E. by E. $\frac{1}{2}$ E., 4 miles distant, and the nearest rocks S.E. $\frac{3}{4}$ E., 3 miles." By the American chart, Kalmoa bearing S.E. by E. leads just to the southward of the Bakka shoal.

When near the north-west point of Dinding, the wind sometimes flies round to the eastward; and if bound to this bay it is better to anchor and wait for the sea breeze from the southward or south-westward, as the current runs to the north-west with an easterly wind.

Water.—The water, which is fetched from a little way up the river, is very good; it may be procured also on the right bank of the river, near the entrance, but it is not so good.

KARANG PANDJANG, or Bakka shoal, bounding Tieroetioep bay to the northward, is about three-quarters of a mile in extent, with $1\frac{1}{2}$ fathoms water over it, and 6 fathoms close to. Tanjong Koeboe, on Billiton, bears from it E. by S. $\frac{1}{4}$ S.; Kalmoa islet S.E. $\frac{1}{2}$ E.; and Kalmanbang S. by W.

ARGO SHOAL, about $1\frac{1}{4}$ miles in extent, with only a foot water over the middle of it, lies N.N.E. $\frac{1}{2}$ E. $4\frac{1}{2}$ miles from the Karang Panjang, and from its outer edge Tanjong Bienga bears N.E. $\frac{3}{4}$ E.; Round mount E. $\frac{1}{2}$ S.; and Tanjong Koeboe, on which are some high trees, S. by E. $\frac{1}{2}$ E.

On the American chart it is remarked that several shoals are reported to lie westward of the Argo shoal.

TWO-FATHOMS PATCH.—A small shoal, with this depth of water over it, lies $1\frac{1}{4}$ miles N.E. $\frac{1}{2}$ N. from the Argo shoal; with Tanjong Bienga bearing N.E. by E. $\frac{1}{2}$ E., distant 2 miles; and N.W. island N. $\frac{1}{2}$ E. $3\frac{1}{2}$ miles.

TANJONG BIENGA is a high bluff point, forming the north-western extreme of Billiton; from this point the coast trends away north-eastward.

ELEVEN ISLANDS are a cluster of small islands lying off the north-western extreme of Billiton. The names of some of them are the Sailors

Hat, Bamboe, Sampit, and Boerong ; the latter is the largest of the group, and lies N.N.E. nearly 2 miles from Tanjong Bienga.

N.W. island or Langwas, the outer and most north-western of the islands, lies just inside the edge of the coral reef which extends from the shore and surrounds the entire group. Its north end is in lat. $2^{\circ} 31\frac{1}{2}'$ S., long. $107^{\circ} 38\frac{1}{2}'$ E.

ALWINA SHOAL.—The ship *Alwina* passed close to a rock lying N.N.W. $1\frac{1}{2}$ miles from the north-westernmost of the Eleven islands. It appeared to be a detached danger, with a depth of 6 to 9 feet on it, and deep water all around.*

SOUNDINGS.—No soundings appear on the charts for a distance of 7 or 8 miles southward and south-westward of the Carnbee rocks, (page 125) nor yet close to those dangers, so that a vessel cannot be guided by the lead when approaching them. Between the Carnbee rocks and the Anvangs bank are 13 to 18 fathoms. The Anvangs bank, Cooper shoals, and Three-foot shoal appear to lie just within the edge of the line of 10 fathoms, running from a position 4 or 5 miles south-eastward of the Anvangs bank, outside the shoals just mentioned.

In the fairway of Stolze channel, from the Carnbee rocks to Pulo Selio, the soundings are 14, 19, 23 and 25 fathoms ; towards the eastern side of the channel they are deeper, 26 to 30 and 34 fathoms, decreasing suddenly towards the 10-fathoms line from a depth of 20 or 23 fathoms near the Cooper and Aanvangs shoals ; and from 30 or 25 fathoms, near the Three-foot shoal and the southern end of Selio.

Towards the shoals on the western side of the entrance to the channel the depths are much less, and they decrease more regularly, the 10-fathoms line extending some 5 or 6 miles to the eastward of them, so that they may be approached by proper attention to the lead. Near the shoals extending from Shoal-water and Hancock islands, and near the Bliss shoal, the 10-fathoms line extends only a little more than half a mile to the eastward, and consequently those dangers must be approached with greater caution.

Between White rock and Table island, in the fairway of Stolze channel, the soundings vary from 23 to 27 or 28 fathoms, with perhaps an occasional cast of 19 or 20 fathoms ; and they are also in this part of the channel deeper on the eastern side, and shoaler on the western side, than in the fairway.

A bank, with 8 to 11 fathoms over it, extends $3\frac{1}{2}$ miles S. by E. from South island.

A mile eastward of Table island are 11 and 14 fathoms, with irregular

* "Mercantile Marine Magazine," November 1858. On the chart this danger is placed $1\frac{1}{2}$ miles N.W. $\frac{1}{4}$ N. from N.W. island.

soundings 18 to 30 fathoms in the fairway of the narrowest part of the channel. From Table island northward to the West point of Mendanao are 30 or 25 fathoms, with perhaps a cast now and then of 16 fathoms abreast of North island, and of 19 or 20 fathoms abreast of the West point. From thence to Gaspar island are 27, 25, 20, 19, 16, and 14 fathoms; and to the eastward of the Akbar shoal 26, 29, 25, 20, and 18 fathoms.

The bottom through the entire length of Stolze channel appears to be composed principally of sand and broken shells, with here and there broken coral. To the north-westward of Billiton the bottom is mostly soft, black mud, with sand and broken coral and shells in places.*

DIRECTIONS through STOLZE CHANNEL from the SOUTHWARD.

—As soon as Blantoe—the highest hill on the south coast of Billiton—can be recognized, it should be brought to bear about N.N.E., and with it just in sight on that bearing, if the weather is clear, a vessel will be about 33 or 35 miles distant from it, in the fairway of the Stolze channel, with the Carnbee rocks about 15 miles to the north-eastward, and may shape a course North or N. $\frac{1}{2}$ W. As the vessel proceeds to the northward, Luda hill will come in sight, and shortly afterwards Pyramid and South peak, all of which will be seen to the right or eastward of Blantoe. Soon the Haycocks will be visible, at first a little to the left of Blantoe, and by the time they are in line with it, Gunong Bolo, on the south end of Selio, will be well in sight, bearing about N.N.E., and distant 14 or 15 miles. Shoal-water island will also be in sight, not perhaps from the deck, but from the mast head or a little way up the rigging, bearing about N.W. by W., and distant 15 or 16 miles.

From this position a N. by W. $\frac{3}{4}$ W. course will lead up to Table island, passing 6 or 7 miles westward of White rock, and 3 or 4 miles westward of Ross island. When abreast of White rock, Saddle and South islands will be seen on the port bow; soon Low island will also rise in sight on the port bow, and the Six islands on the starboard bow; and as they are approached—if the N. by W. $\frac{3}{4}$ W. course has been preserved—Table island will be seen right ahead in mid-channel.

Table island should be approached on a N. by W. $\frac{3}{4}$ W. bearing until the West point of Mendanao bears N. by E. or N. by E. $\frac{1}{4}$ E., which will lead between Table island and the reefs extending N.N.W. from

* "Stolze channel is easy for a stranger; but the nature of the bottom, and the depth of water in it is against anchoring, in the event of calms or thick weather. North of Gaspar strait we always found a soft bottom, whereas in Stolze channel, besides the inconvenient depth, it is of rock or coral: the strength of the current probably prevents the accumulation of mud. Hoog island, off the north-west coast of Mendanao, shows conspicuously, and is a good distinguishing mark; at night we found it an easy object to see."—Captain the Hon. C. G. J. B. Elliot, C.B., H.M.S. *Sybilie*, 1855.

Kasenga. When the north point of North island bears W.N.W., either steer N.N.W. for Gaspar island, which will lead 3 miles eastward of the Hewitt rock and 2 miles westward of the western of the two positions ascribed to the Akbar shoal; or bring North island S. by W. $\frac{1}{4}$ W., and steer N. by E. $\frac{1}{4}$ E., or N.N.E., which will lead 4 or 5 miles westward of the dangers extending from Rotterdam island, and into the China sea eastward of the Akbar and Canning shoals.

Working through from the Southward.—*When standing to the eastward*,—to avoid the Carnbee rocks, Blantoe hill must not be brought north of N. by E.; and to clear the Anvangs bank and Cooper shoal, Gunong Bolo must not be brought west of N. by W. When Blantoe bears N.E. $\frac{1}{4}$ N., or the Haycocks N.N.E. $\frac{1}{4}$ E., Gunong Bolo must be kept east of N. by E., to avoid the Three-foot patch.

The dangers southward of Selio should not be approached under a depth of 10 fathoms, or White rock brought to the west of N. by W. $\frac{1}{2}$ W.; and when Gunong Bolo bears N.E. by E. $\frac{1}{2}$ E. White rock must be kept to the east of North, to avoid the edge of the bank which lies S.S.E. nearly a mile from it. White rock should not be approached nearer than a mile, nor to a less depth than 14 or 13 fathoms; when northward of White rock, it must not be brought anything south of E.S.E. until the north point of Pulo Selio bears E. by N. $\frac{1}{2}$ N., to clear the $1\frac{1}{2}$ feet patch lying nearly 2 miles north-west of it. The Koerier bank should not be approached under a depth of 10 fathoms, or White rock brought south of S.E. by S.

Gunong Bolo kept east of S.E. by E. will lead clear of the Koerier bank, and to the south-west of the foul ground between it and the Six islands. Ross island bearing N.N.W. $\frac{1}{4}$ W. leads westward of the foul ground, and also clear of the dangers lying south-east of Ross island. Kasenga bearing North clears the dangers extending from the west side of Ross island; and the hill on the West point of Mendanao, if not brought to the north of N. $\frac{1}{2}$ E., will lead well clear of the rocks which extend more than a mile N.N.W. from Kasenga, and will also clear all danger contiguous to the Six islands. When Table island bears W. by N. a vessel will be northward of the dangers extending from Kasenga, and may stand eastward until the hill on the West point bears N. $\frac{1}{4}$ W. (see page 129).

As Pulo Ayam is neared, the hill on West point must not be brought to the west of North, and the islet must not be approached nearer than a mile, or the extreme of West point brought to the west of North. To clear the dangers about Hoog island, West point should not be brought to the south of S.S.E. until Rotterdam island bears N.E., when

Hoog island in line with West point bearing South, will lead clear of the dangers westward of Rotterdam island. Rotterdam bearing S.W. leads clear of the shoal bank extending from the north point of Batoe Dinding.

The dangerous coast of Billiton northward of Mendanao should not be neared under 5 or 6 miles; the summit of the north range of hills on Mendanao S.S.W., or Taling, the highest hill on Mendanao, on the same bearing will lead well clear of all danger. N.W. island and Boorong island should not be approached nearer than 2 miles, and caution must be observed to avoid the position of the Alwina shoal (see page 132).

When standing to the westward, Shoal-water island, if not brought to the east of North, will clear all danger from the Larabe shoal to the Middle reef, and the lead will also give good warning when standing towards them, as they lie some 4 or 5 miles within the edge of the 10-fathoms line. Shoal-water and Hancock islands must be approached with caution, as the lead does not give much warning when nearing their ledges; they should on no account be approached under a depth of 10 fathoms, or within $2\frac{1}{2}$ miles. Hancock island bearing South leads clear of the Bliss shoal, between which and South island a vessel may stand to the westward until the summit of South island bears N.E. by N., which will lead clear of the Vansittart shoals and the dangers about Saddle and Low islands.

Saddle island bearing W. $\frac{1}{2}$ S., leads southward of the dangers extending from South and Table islands. When near Table island, its south point should not be brought to the eastward of North, to avoid the 3-fathoms patch lying nearly three-quarters of a mile south-west of it. The east side of Table island may be approached to a mile; but the east side of North island has dangers lying nearly a mile off it, and to clear them Table island must not be brought eastward of S.S.E. The east extreme of South island just open of the east extreme of North island bearing S. by E., leads a mile eastward of Hewett shoal.

DIRECTIONS through STOLZE CHANNEL from the NORTHWARD.

—Having passed eastward of Gaspar island, bring it to bear N.N.W., and keep it so, steering S.S.E., and it will lead into the fairway of Stolze channel, midway between West point and the Hewett shoals, and in this track the soundings will be 14, 16, 20, 22, 28, and 26 fathoms. When West point bears East distant 4 or 5 miles, Table island will be seen on the starboard bow, with North and South islands to the right of it. Continuing the S.S.E. course, the Six islands will soon be visible on the port bow, and, after passing Table island at about 2 miles on the starboard beam, West point will soon bear N. by E., or N. by E. $\frac{1}{4}$ E., when an opposite course may be steered to pass between Table island and the dangers extending N.N.W. from Kasenga.

When Table island bears N. by W. $\frac{3}{4}$ W., all danger will be cleared near the Six islands, and if kept upon that bearing it will lead mid-channel between White rock and Shoal-water island, having passed which, the most convenient course may be shaped to the southward, giving a good berth to the shoals extending from the Branding breakers to the Larabe shoal, on the western side of the channel, and to the Anvangs bank and Carnbee rocks on the eastern side.

Entering Stolze channel to the eastward of the Akbar shoal, between it and the north-west coast of Billiton, steer to the south-west,—giving the Billiton coast a berth of 4 or 5 miles—and as soon as North island can be made out, bring it S.S.W., and it will lead well to the westward of the dangers near Rotterdam island. When Table island bears a little east of South, a S.S.E. course may be steered until West point bears N. by E., or N. by E. $\frac{1}{4}$ E., which leads midway between Table island and the reefs off Kasenga ; when proceed as before.

Working through from the Northward.—*When standing to the eastward*, the north-west coast of Billiton should not be approached nearer than 5 or 6 miles, or the summit of the north range of hills, on Mendanao, brought westward of S.S.W. (page 135). Rotterdam island, bearing S.W., will lead clear of the reefs extending from the north side of Batoe Dinding, and the islet off the north-east point of the latter island, bearing East, will clear the dangers northward of Rotterdam. West point bearing South will clear the rocks, &c., which lie westward of Rotterdam, and bearing S.S.E. will clear the reef surrounding Hoog island.

West point and Pulo Ayam should not be approached much under a mile, as a reef extends about a third of a mile outside them ; after passing Pulo Ayam, the hill near the extremity of West point, if not brought north of N. $\frac{1}{2}$ E., will keep a vessel outside the dangers between Mendanao and the Six islands. Kasenga bearing North, leads westward of Ross island ; and Ross island N.N.W. $\frac{1}{4}$ W., or Gunong Bolo, on Pulo Selio, bearing S.E. by E., leads clear of the dangerous elbow of foul ground to the westward of Gull rock, and also clear of the Koerier bank.

To avoid the $1\frac{1}{2}$ feet patch at 2 miles N.W. from White rock, do not bring White rock south of E.S.E. after the north point of Selio bears E. by N. $\frac{1}{2}$ N. White rock should be passed about a mile off, and afterwards not brought west of N. by W. $\frac{1}{2}$ W., to avoid the edge of the bank about a mile S.S.E. from it. Gunong Bolo N. by E., leads westward of the Three feet shoal ; and the Haycocks N. by E. $\frac{1}{2}$ E., or Blantoe hill N.N.E. $\frac{1}{4}$ E., leads westward of Cooper shoal and the Anvangs bank. To avoid the Carnbee rocks, Blantoe hill must not be brought to the north of N. by E.

Standing to the westward towards Hewitt shoal, take care not to shut in the east point of South island behind the east point of North island; these points just open lead a mile eastward of the shoal. North island should not be approached on the east side nearer than $1\frac{1}{2}$ miles, or Table island brought to the east of S.S.E., to avoid the dangers off it; and Kasenga bearing S.E. $\frac{1}{2}$ E. will clear the reef off the east side of Table island. Table island should not be brought to the east of North until Saddle island bears W. $\frac{1}{2}$ S., when a vessel will be southward of the dangers extending from Table island and South island; after which she may stand to the westward until the summit of South island bears N.N.E.

Hancock island bearing South, leads eastward of Bliss shoal, but Hancock and Shoal-water islands must on no account be approached nearer than $2\frac{1}{2}$ miles, or to a less depth than 10 fathoms, which will be not far from the shoals, the lead giving very little warning in this locality. When to the southward of Shoal-water island shoals, Shoal-water island kept to the west of North, will clear the dangers extending from the Branding breakers to the Larabe shoal; the lead, also, will give sufficient warning, as the 10-fathoms line, on the edge of the bank, is 4 or 5 miles to the eastward of them.

NORTH-EAST COAST OF BANKA.

The mariner cannot be too cautious in approaching this exceedingly dangerous coast. It was surveyed by the late Lieut. James Robinson in 1819, but the many dangers which front it are very imperfectly known, their positions depending for the most part upon the accounts of commanders of vessels who have found themselves too close in and entangled amongst them when running for Gaspar strait in thick weather.

HILLS and MOUNTAINS.—There are many hills along this coast near the sea, and some mountains inland; one of these, called the Saddles, 912 feet high, rises about 9 miles westward of Tanjong Brekat. At 9 miles westward of the Saddles is the conspicuous range of the Padang mountains, the highest summit of which is elevated 2,630 feet. About 21 miles westward of Tanjong Riah, or in lat. $1^{\circ} 50' S.$, long. $105^{\circ} 53' E.$, is the double peaked mountain Gunong Marass, 2,300 feet high, the largest mountain on the northern part of Banka.

The COAST from Brekat point trends W. by N. 21 miles to Lanka point, 2 miles westward of which is Koba village. This part of the shore may be approached as near as 4 miles in 7 to 8 fathoms water, as the shoals are not more than 2 or 3 miles from the land. Near the roadstead of Koba the depth decreases, and the anchorage is in $4\frac{1}{2}$ fathoms,

with the mouth of a river S. $\frac{1}{2}$ W., Boear island N. $\frac{3}{4}$ E., and Tetawa island N.N.W. $\frac{1}{2}$ W. About 16 miles N.W. by W. from Lanka point is the large village of Koeraw, from whence the coast trends N. by W. and N.N.W. to the river Marawang, near which stands the village of Pankal Pinang. The mouth of the river is in $2^{\circ} 4\frac{1}{2}'$ S.

TETAWA BANK.—Fronting the coast between the village of Koeraw and the Marawang river is an extensive chain of banks 15 or 16 miles long, and from 1 to 5 miles broad, known under the general appellation of Tetawa bank, upon which are several scattered islands. Many of the patches become dry, and but few have as much as 4 fathoms water over them.

Pulo Boear or Colowy, the outermost of the above islands, is very small, and lies near the south-east end of the bank in lat. $2^{\circ} 14\frac{1}{2}'$ S., long. $106^{\circ} 31'$ E. The edge of the bank is about half a mile eastward of this island, and about a mile to the southward of it.

Pulo Passir is a small sandy islet lying E.N.E., distant $4\frac{1}{2}$ miles from Pulo Boear.

Pulo Tetawa is about the same size as Boear, from which it bears East-northerly, distant 8 miles. It lies near the south-west extreme of the bank, the edge of which is half a mile to the southward and 2 miles to the westward of it.

Pulo Panjang, the largest of these islands, lies on the northern part of the bank, N. by E. $\frac{1}{2}$ E., distant 7 miles from Tanjong Poyang, and E.S.E. 8 miles from the entrance of the Marawang river.

The bank extends about three-quarters of a mile to the northward of this island, but other shoals, known as the Sullivan patches, &c., extend to a distance of 5 miles between the bearings of N.E. and N.W., and for the distance of $3\frac{1}{2}$ miles in a W. by N. direction towards Tanjong Bunga, the nearest point of Banka.

Pulo Bojur lies about a mile eastward of Pulo Panjang. A reef projects from it in a crescent form, one horn extending about a mile north-east from the island, and the other horn about the same distance to the south-east.

A Rock awash is said to lie N. by E. 2 miles from Pulo Bojur.

George Rock.—Between the Tetawa bank and the Banka shore is a passage with $2\frac{1}{2}$ to 3 fathoms water in it, much used by small vessels in communicating between Koba and the Marawang; but in the middle of it lies the George rock, from which Panjang island bears North, Tetawa island S.E. by E., and Poyang point S.W.

HORSE, MENTAWA, and GOAT SHOALS are to the eastward of Tetawa bank. The Horse, lying E. $\frac{1}{2}$ S. $3\frac{1}{2}$ miles from Pulo Boear, is a small patch, nearly dry at low water.

The Mentawa reef, lying about a mile N. by W. from the Horse, and E.N.E. 3 miles from Pulo Boear, is more extensive than the Horse, both together occupying a space of about 3 miles; between them are 7 or 8 fathoms water.

Goat shoal lies 3 miles northward of the Mentawa reef, and N.E. by N. 6 miles from Pulo Boear; 9 feet water is reported upon this shoal.

The Channel between Pulo Boear and the above shoals is shown on the charts to be about $2\frac{1}{2}$ miles wide, with depths of 7 or 8 fathoms in it; but from the following account, taken from the Java Guide, it would appear that either other dangers must lie in the channel at the distance of a mile from Pulo Boear, or that the Mentawa or the Horse reef must extend much farther to the westward than was supposed, thus rendering the channel exceedingly narrow:—

“In May 1847 H.N.M. schooner *Aruba*, when standing between Boear island and the Horse and Mentawa reefs, passed a few cables’ lengths to the westward of a reef, having Boear island W. $\frac{1}{2}$ S. a mile distant. With Boear island S.S.W. $\frac{3}{4}$ W. and Passir island W. $\frac{1}{2}$ N. she again fell in with reefs, but avoided them by keeping N.W. till Boear island bore S. $\frac{1}{2}$ E. and Passir island W. by S. $\frac{1}{2}$ S. The channel had 8 to $8\frac{1}{2}$ fathoms; hence it is very probable that the Mentawa is a more extensive reef than had been supposed.” The Dutch shoal, lying 11 or 12 miles eastward of the above shoals, is described at page 146.

FATHOOL BARIE SHOAL.—The *Fathool Barie* struck on a rocky bank, with $2\frac{1}{2}$ fathoms on it, in lat. $2^{\circ} 5' S.$, long. $106^{\circ} 28' E.$, with Mount Pouak bearing N.W. $\frac{1}{4}$ W., Pulo Panjang W.S.W., Pulo Tetawa S.S.W., and Pulo Boear S. by E. $\frac{1}{2}$ E.

GENERAL ELLIOTT REEFS.—The *General Elliott* found herself entangled among some reefs, with Panjang island S. by W. $\frac{1}{4}$ W. 5 miles, and a point of Banka, being the eastern foot of the hill south of Koba, S.S.E. $\frac{1}{2}$ E., then being in 8 fathoms. More to the northward, this vessel ran over some 7-fathoms banks with probably shoaler spots; they lie in $1^{\circ} 55' S.$, 12 miles from Banka.

SULLIVAN REEFS, HILLSBOROUGH ROCK.—The *Sullivan*, on returning from China, December 1784, and trying to get sight of Banka during thick weather, ran as far in as $13\frac{1}{2}$ fathoms, rocky bottom, and there saw three patches of breakers, one bearing S.S.W. 3 miles; another S.E. by S. the same distance; and the third E.N.E. 4 miles. Between the breakers a few rocks were visible above water. The weather being thick prevented Banka being seen; but it was supposed the rocks were in $2^{\circ} 3' S.$ and North from Panjang island.

The *Hillsborough*, in March 1788, returning from China and steering

for Gaspar strait, struck on a rock having 3 feet water on its shoalest part, and while the bow was aground there were 13 fathoms under the stern. When the vessel floated, she anchored in 14 fathoms to the westward of the rock, with the extremes of Banka N.N.W. and S.E., five small islands about South, and in about $2^{\circ} 3' S.$; the reef extended S.E. and N.E. from the vessel.

Horsburgh remarks that:—"The five islands bearing South from the ship, when at anchor near the reef, must have either been Pulo Panjang and the islet near it, or Pulo Colowy (Boear) and the islands contiguous, about 9 miles south-east of Panjang; it seems, therefore, very probable that the reef on which this ship struck was one of those seen in the *Sullivan*." The depth of water is also in favour of this probability; but it is manifest that the positions of these dangers are altogether uncertain. The soundings near the Sullivan patches, where they are placed upon the chart, are but 7 and 8 fathoms.

DIEDERIKA, ROBERTS, and other SHOALS.—The Diederika shoal, with 3 feet water over it, and 13 to 14 fathoms around it, is thought to lie about 11 miles north-eastward of Pulo Panjang, and 5 miles to the southward of Palmer reef, in lat. $1^{\circ} 59' S.$, long. $106^{\circ} 28' E.$

Roberts shoal lies about $4\frac{1}{2}$ miles to the westward of Diederika shoal. It has 12 feet water over it, and 10 fathoms near it.

Between these shoals and Pulo Panjang, and from thence to the coast, there are numerous rocky shoals, with from 7 to 5 fathoms water between them, but their exact positions are unknown.

PALMER REEF, is probably part of the northern bank over which the *General Elliott* passed (page 139); the following description of it is given by Captain George Palmer of the *Boddam*:—

"August 27, 1811, at 45m. p.m., the vessel suddenly struck, having five minutes previously had 14 fathoms, and then passed rapidly over the reef into 10 fathoms. The next casts were 11, 10, 11 fathoms successively, and we then anchored, the breeze blowing fresh from S.E. When at anchor, Riah point bore W.N.W. 15 miles; the southernmost of the low islands near Panjang island S.S.W. $\frac{3}{4}$ W. 12 or 14 miles; and, according to the log, $2\frac{1}{2}$ miles S.S.W. from the spot where the vessel struck."

CAUTION.—The Java Guide observes that "all these dangers may be avoided by keeping in not less than 16 fathoms, where there is generally a muddy bottom, whereas in 15 fathoms it generally becomes rocky."

TANJONG RIAH, in lat. $1^{\circ} 52' S.$, long. $106^{\circ} 14' E.$, is distinguished by two hills, and from its south-east and south sides an extensive reef projects, which makes it necessary to keep 6 or 8 miles in the offing.

Black Rock reef, lying $5\frac{1}{2}$ miles to the south and south-east of Tanjong

Riah, is very extensive, with only 3 feet water over it in some places. Near it, and also the reef fronting Tanjong Riah, there are 9 and 10 fathoms water.

Tate rocks, 4 miles S.S.E. from Tanjong Riah, are 14 feet above water.

Other shoals lie S.E. by S. 8 miles from Tanjong Riah ; and E.N.E., 4 miles from it, is a patch of 5 fathoms water.

To avoid these dangers keep Panjang island to the westward of South, and go no nearer the shore of Banka than 7 fathoms water, when approaching Marawang road.

MARAWANG ROAD.—Marawang or Pankal Pinang, the chief town of one of the tin districts, is situated a few miles up the Marawang river, the entrance of which lies about W.N.W. 7 miles distant from Pulo Panjang, and can only be approached by vessels with the greatest caution, on account of surrounding dangers.

H.N.M. schooner *Windhond* anchored in Marawang road in $3\frac{1}{4}$ fathoms, with the elbow near Riah point N. by W., Marass mountain N.W. by W. $\frac{1}{2}$ W., the north point of the river West, the Lappa hills S.W. $\frac{1}{4}$ S., Tetawa island in one with Koba village S.E. by S., the high trees of Panjang island S.E. $\frac{1}{4}$ S., and Bojur island S.E. $\frac{3}{4}$ E. By not bringing the south point of the river to the northward of West a vessel will avoid the rocks which lie a mile S.E. from the anchorage.

Water.—Good water can be obtained at Pankal Pinang.

DIRECTIONS.—Vessels bound from Macclesfield channel to the ports of Pankal Pinang or Roessah, pass between Tree island and Brekat point, and to the westward of the Columbian and Dutch shoals, in 12 to 14 fathoms water, but in not a greater depth—as the Columbian lies in the stream of 17 fathoms—till Boear island bears S.W. by S., and Panjang island West ; a depth of 16 fathoms must then be kept till Riah point bears West. From thence steer direct for that point till in 7 or 8 fathoms, having Panjang island S. $\frac{1}{2}$ W., on which bearing the island may be approached till the north-west peak of the Lappa hills bears S.W. $\frac{1}{2}$ W., which course leads direct to the anchorage.*

Horsburgh gives the following directions :—When bound to the road of Marawang, approach Riah point till in 7 fathoms, and the Blusor rock, which will be visible from the deck 5 miles (probably the Tate rocks), till in 5 or 7 fathoms, and at $1\frac{1}{2}$ miles distant. When southward of the rock keep off shore, but not into a greater depth than 10 or 11 fathoms, and if clear weather, Panjang and Bojur will be visible. Bring the extremes of these islands South, and keep them on that bearing till the north-

* Java Guide.

western peak of the Lappa hills bears S.W. $\frac{1}{2}$ W.; then steer direct for it, till Tetawa island is open to the westward of Panjang island, and till the western point of the latter island bears S.E. by S. The anchorage is in $4\frac{1}{2}$ fathoms, with the mouth of the river W. $\frac{1}{2}$ N., and a range of rocks which are partly dry S.E. by S. 4 miles distant.

A brig trading to Marawang for tin got entangled in the numerous shoals near that place, although she had a Malay pilot on board, and grounded on one of them, which obliged her to lie near Pulo Panjang, where she received her cargo from Marawang.

LIAT BAY, formed between Tanjong Lyang to the north-west and Tanjong Riah to the south-east, affords good anchorage with shelter from southerly and westerly winds in 5 fathoms, white stiff clay, about three-quarters of a mile off shore; but in the eastern monsoon the swell is very heavy.

The anchorage is in $4\frac{1}{2}$ fathoms, with the mouth of the river W. by N.-northerly, Lyang point N.N.W. $\frac{1}{2}$ W., and Riah point S.E. by S. From the river, nearly to the south-east point of the bay, a fine sandy beach lines the shore, with gradually decreasing soundings. The town of Liat, usually known as Songi Liat, stands a short distance up the river, and is a chief town of one of the tin districts.

Water—Wood.—Fresh water here is very difficult to be procured, on account of the rocks in the mouth of the river, which can only be entered at high water, when these rocks are under water; but then there is a heavy surf on them, that places the boats in danger of being upset, which happened in July 1834 to a boat of H.N.M. brig *Meermin*. Wood and spars of any dimensions may easily be obtained on the south side of the bay, within half a mile of the shore.

Dangers.—The three following dangers are very much in the way of vessels frequenting this bay.

Liat reef, lying E. by S. $\frac{1}{2}$ S. $3\frac{1}{2}$ miles from Tanjong Lyang, has but 6 feet water over it, and from its north extreme the north point of the river Liat is in one with the southern peak of Marass mountain W. $\frac{3}{4}$ S., and Riah point S. $\frac{3}{4}$ E.; close to the reef there are 6 or 7 fathoms water.

A patch said to have 4 fathoms water over it lies S.E. by E. about $2\frac{1}{2}$ miles from Lyang point. A rock is also shown on this patch upon the chart, and Horsburgh mentions that care must be taken to avoid a rock with only 4 feet water over it.

Circe reef, discovered by H.N.M. schooner *Circe*, has $2\frac{1}{2}$ fathoms over it, and 6 or 7 fathoms around it. From the reef the hill on Lyang point bears W. by N. $\frac{1}{2}$ N., Simbang island N.W. $\frac{1}{2}$ W., and the hill on Tanjong Riah S.W. $\frac{3}{4}$ S.

TIDES.—At full and change it is high water in Liat bay at 5 p.m., and the rise of tide is 9 feet.

DIRECTIONS.—Approaching Liat bay from the northward, $5\frac{1}{2}$ or 6 fathoms will be found at 2 miles from Liang point, and in a southerly direction towards the anchorage.

Coming from the eastward, and being in 10 or 11 fathoms, bring Riah point S.W. by W., and keep towards it till Lyang point is N.W. by W. $\frac{1}{4}$ W., then steer W.N.W. and W. by N. towards the anchorage.

The COAST from Tanjong Lyang runs N.N.W. to Tanjong Tuen, in lat. $1^{\circ} 35\frac{1}{2}'$ S., which has a hill on it, and there are several hills farther inland. Close to the point is Pongoh islet, which can be approached to half a mile. The coast to the southward of it forms a very shallow bay, in which, at about 6 miles S.S.E. from Tanjong Tuen, is a small island named Pulo Simbang.

This part of the coast may be approached to 13 fathoms, and even less.

The coast from Tanjong Tuen runs about N.W. by W. for $10\frac{1}{2}$ miles to Tanjong Crassok or Moncudu, the northern most point of Banka, where it turns sharply to the westward. Nearly a mile off shore, distant $2\frac{1}{2}$ miles W. by N. from Tanjong Crassok, is the small island of Moncudu (page 97).

DANGERS NORTHWARD AND NORTH-WESTWARD OF GASPAR STRAIT.*

CANNING ROCK, in lat. $2^{\circ} 23'$ S., long. $107^{\circ} 15'$ E., on which, in April 1825, the East India Company's ship of that name struck on returning from China, lies directly in the route of vessels proceeding towards Gaspar strait and therefore is very dangerous, there being only 3 fathoms on it, with 17 to 20 fathoms close to. From the spot where this ship grounded, Gaspar island bore W. by S. 10 miles; Brekat point S.W. by W. $\frac{3}{4}$ W.; the hummock near that point S.W. by W. $\frac{1}{2}$ W.; the summit of Mendanao island S.S.E.; and Hoog island S. by E. $\frac{1}{4}$ E.

This danger consists of many coral heads, extending N.E. and S.W. about 100 yards, and East and West 50 yards. On the spot where the *Canning* grounded the soundings were 9 fathoms under the port fore-chains, 5 under the starboard main chains, 3 under the port main chains, and 4 fathoms at the stern; and 20 yards astern there were 3 fathoms, coral bottom. From the maintop, at a quarter of a mile distant, nothing of it was visible, and as it is greatly in the way of vessels coming from the

* See Chart of Gaspar and Banka Straits, No. 2,149.

northward towards the strait, Gaspar island ought to be made bearing well to the southward, and should be approached within 5 miles, or nearer, before it is brought to bear W.S.W., in order to give a wide berth to this danger.

SOWERBY SHOAL.—The following account of a shoal seen by Captain J. Sowerby, of the ship *Montmorency*, is given at page 29 of the *Mercantile Magazine* for 1862.—“April 1st, 1861, 9.30 a.m.—Light baffling airs from S.E. and clear weather, discovered a shoal with apparently not more than 2 fathoms water over it; by good cross bearings the middle peak of Mount Tebalo (north end of Billiton island) bore S. 32° E., and peak of Gaspar island S. 66° W.; which places it in lat. 2° 13' S., long. 107° 35' 10" E.; also the mean of three good chronometers, gave long. 107° 36' E. This shoal is about 3 miles long N.W. and S.E., and a third of a mile broad, and is very dangerous, as it lies right in the track of vessels beating out of the Stolze channel to the northward in the northerly monsoon. The water being smooth at the time, the sea was not observed to ruffle in the least over it; but no doubt when there is any swell at all the sea must break on it. I watched from the deck, and afterwards from aloft, and have not the slightest hesitation in saying that it could be easily discerned 5 miles off, with the sun as it was then, the shoal being between us and that luminary. I am quite positive as to the accuracy of my observations.”

The above bearings of Mount Tebalo and Gaspar peak, places the danger on the Admiralty Chart in lat. 2° 15' S., long. 107° 28' E., or 8 miles westward of the observed longitude.

A ROCK is marked doubtful on the charts in lat 2° 19½' S., long. 107° 2' E., with the peak of Gaspar island bearing S.S.E. ¾ E. 6¼ miles, and Tree island S. by W. ¾ W. 9 miles.

This rock may have found its place on the chart from a statement in the *Java Guide*, page 303, “that the ship *Sullivan*, in December 1784, with Tree island bearing S. ½ E., Gaspar island S.E., and Glassa island S.E. by S., observed breakers W.S.W. (query E.S.E.) 6 miles.”

WARREN HASTINGS REEF is supposed to extend about 3¼ miles N. by W. and S. by E., and to have but 2 to 9 feet water over it in some places. In 1788 the *Warren Hastings*, returning from China, grounded upon the south-east projecting point of this reef, having a short time previously had regular soundings from 20 to 22 fathoms. Under the stem there were only 2 feet water, 4 fathoms amidships; the high land of Banka bore S.W. by W., the most distant visible land S.S.W. and S.W. by W. ½ W.,

the centre of Gaspar island S.E. by E. $\frac{3}{4}$ E., Tree island S. by E. $\frac{1}{2}$ E., the latitude by the sun's meridian altitude being $2^{\circ} 23'$ S. On examining the shoal with the boat there were in some places 2 and $1\frac{1}{2}$ fathoms. In 1845 the English vessel *Gondolier* was wrecked on this reef. The French vessel *Joseph* places it in $2^{\circ} 21'$ S. and $106^{\circ} 56' 45''$ E., with the centre of Gaspar island S.E. by E., Belvidere rock N.N.E., and the wreck of the *Gondolier* S.S.W.

CHRYSLITE ROCK is said to lie $1\frac{3}{4}$ miles eastward of the southern part of Warren Hastings reef. The following account is given of it :*—"On the 10th of September 1851, the *Chrysolite* of Liverpool, while working between the Belvedere and Warren Hastings shoals, after weathering the latter, narrowly escaped striking on a rock which apparently did not carry more than 4 feet water, with these bearings : Tree island S. $\frac{1}{2}$ E.; Brekat point S.S.W. $\frac{1}{2}$ W.; and the centre of Gaspar island E. by S."

COLUMBIAN SHOAL is marked doubtful on the chart, N. by W. $\frac{1}{2}$ W., distant 14 miles from Brekat point, from the following report by Captain G. Wakem, of the ship *Columbian*, who stated that his vessel struck upon it in April 1845 :†—"At dusk the north point of Leat island bore S.S.E. 12 miles. At 3.30 a.m., shortly after having sounded in 17 fathoms, the vessel touched on a reef, but without being brought up, although the reef had not more than 10 feet water upon it. Anchored immediately with Gaspar island E. by S. distant 16 miles, and Tree island S.E. by E. $\frac{1}{4}$ E. 12 miles. The next day the vessel was left in a sinking condition."

BELVEDERE SHOALS.—The south-western end of these shoals is a reef under water, in lat. $2^{\circ} 14\frac{1}{2}'$ S., long. $107^{\circ} 1'$ E., and from it Gaspar peak bears S.S.E. $\frac{1}{4}$ E., distant 11 miles ; from thence they extend to the north-eastward $4\frac{1}{2}$ miles. Near their middle is a sand-bank awash ; there are besides on them many coral patches with 6 to 10 feet water, and on their north-eastern extreme a black rock 10 feet high and 40 feet long. When there is a heavy swell the sea breaks on them, and by day they may easily be avoided by a good look-out, particularly as some of the patches are dry at low water. However, a vessel from New York was wrecked on these shoals, and shortly afterwards a Chinese junk. It was probably their breakers which were observed from the *Hawk* in 1785, bearing N.E. 6 miles, and E. by N. 3 miles, Gaspar island S.S.E. $\frac{1}{2}$ E., and part of Banka S.W.

* Java Guide, page 302.

† Nautical Magazine, 1846.

DUTCH SHOAL (Vansittart shoal of Horsburgh), lies in lat. $2^{\circ} 10\frac{1}{4}'$ S., long. $106^{\circ} 46\frac{3}{4}'$ E., with the peak of Gaspar island bearing about S.E. by E., distant 24 miles.

The *Vansittart*, Captain Lestock Wilson, struck on this shoal, and was with great difficulty run upon a sandy beach of Banka, to save the lives of the crew.

A SHOAL of 6 feet water is marked on the Dutch chart N.W., distant $11\frac{1}{2}$ miles from the Dutch shoal.

MAGDALEN REEF, discovered in November 1806 by the American vessel *Magdalen*, is very dangerous in thick weather for vessels bound to Gaspar strait from the northward, for when the reef was first seen the vessel was only half a cable's length from it. The boat found it to consist of two coral rocks, about 160 yards in length and 30 yards in breadth, with deep water between them, 11 feet upon them, and at half a cable's length from the shoal 19 to 21 fathoms.

Captain Ross, in 1818, determined the position of this reef to be lat. $1^{\circ} 59'$ S., long. $107^{\circ} 1'$ E., the peak of Gaspar island bearing from it S. $\frac{3}{4}$ E., distant nearly 26 miles.

LANRICK or NEWLAND SHOAL, with only 9 feet water over it, lies 8 or 9 miles northward of the Magdalen shoal. The clipper brig *Lanrick*, Captain T. B. White, struck upon this shoal in 1852; and the ship *Asia*, Captain Newland, in October 1853. Both vessels took great pains to determine its exact position, and the mean of their observations places the danger in lat. $1^{\circ} 52'$ S., long. $107^{\circ} 1' 30''$ E. Captain White says :—"It is of very small extent, and exceedingly dangerous, the soundings giving no warning, for the next morning at anchor, and not more than $1\frac{1}{4}$ miles from its position, the boats after a two hours' search could not find it, nor did they see any discoloured water, or get less than 17 fathoms." Captain Newland remarks also† that no discoloured water could be seen at the distance of a mile from the shoal.

ATWICK ROCK was discovered by an English vessel of that name, in August 1831. Its position was given in lat. $1^{\circ} 48'$ S., long. $107^{\circ} 30'$ E., or N.N.E. $\frac{3}{4}$ E. $44\frac{1}{2}$ miles from Gaspar island.

PRATT ROCK, in lat. $1^{\circ} 32'$ S., long. $107^{\circ} 26'$ E., is described as dangerous, extending north and south half a mile, and apparently level with the water's edge, having a rock (or dead tree, many of which were floating about) on its northern end.

CATHARINE REEF was discovered in September 1840, by the ship *Catharine*,‡ which anchored at 1 p.m. in lat. $1^{\circ} 31'$ S., long. $107^{\circ} 1'$ E.,

* Nautical Magazine, 1853.

† Naut. Mag., 1854.

‡ Naut. Mag., 1841.

in 18 fathoms water. They observed breakers in a N.N.E. $\frac{1}{2}$ E. direction, at half a mile distant, on a reef which seemed to extend about 3 miles E. by S. Though the vessel remained at anchor till 5 p.m. it does not appear that any further observations were made. Its position is marked doubtful on the charts.

ACTÆON ROCK.—H.M.S. *Actæon*, when proceeding to the northward through Gaspar strait, passed Gaspar island at sunset, 7th July 1857, and at midnight, running 8 knots, struck on an unknown coral reef, which, when examined the next day, was found to be between 2 and 3 cables lengths in extent, steep-to, with patches of 7 feet on it, and 17 fathoms all around. Its position is lat. $1^{\circ} 39' 48''$ S., long. $106^{\circ} 37' 58''$ E., or East about 8 miles from the Severn shoal. The land was observed from the mast-head, whereas from the Severn shoal the hills on Banka are said to have the appearance of separate islands.

SEVERN SHOAL, discovered in May 1802 by the American ship *Severn*, lies exactly in the track of vessels from Toty island towards Gaspar strait. It is placed on the chart in lat. $1^{\circ} 39'$ S., long. $106^{\circ} 30'$ E., but from the following account its exact position is very doubtful.

At sunset Gaspar peak bore S.E. $\frac{3}{4}$ S., 14 miles distant. From this situation the *Severn* steered N.W. $\frac{1}{2}$ N. 35 miles, and at daybreak struck on a coral reef, but got off after being lightened of 30 tons of ballast. The reef seemed to extend 2 or 3 miles N.N.E. and S.S.W., but where the vessel grounded there were 10 feet water. The hills on Banka had the appearance of separate islands, above which the Marass mountain was visible, and the nearest land was computed to be about 20 miles distant. The *Columbian*, of New York, was wrecked on this shoal in March 1824, when returning from China. The crew reached the harbour of Mintok in the long-boat, after having suffered much from deprivation and fatigue.

A SHOAL with $2\frac{3}{4}$ fathoms of water over it appears on the charts at 7 miles West of the Severn shoal in lat. $1^{\circ} 39'$ S., long. $106^{\circ} 21'$ E. Like the Severn and Actæon shoals, it is much in the way of vessels passing between Gaspar strait and Toty island.

CELESTIAL REEFS.—The American ship *Celestial** saw a bed of rocks under water in lat. $1^{\circ} 16'$ S., long. $106^{\circ} 50'$ E.; sounded in 3 fathoms, but there appeared to be less water on the rocks; the next cast of the lead was 17 fathoms.

VEGA SHOAL was discovered in September 1826, by Captain Jose Antonio de Vega, of the Spanish frigate *Vellos*, which struck on it, but

* Nautical Magazine, 1855.

by carrying out an anchor she was hove off. It was described as being not more than a ship's length in extent, with 18 to 21 feet water over it, and 9, 11, 17, and 22 fathoms around it. Captain de Vega placed it in lat. $1^{\circ} 10' S.$, long. $106^{\circ} 34' E.$, by chronometers regulated the day previously at Gaspar island.

The barque *Marquis of Hastings*, Captain Ingram, grounded upon this bank, in May 1830. Captain Ingram placed it in $1^{\circ} 6' S.$, and $106^{\circ} 31\frac{1}{2}' E.$ by chronometers. It was considered to be about three ships' lengths in extent, N.W. and S.E., a ship's length wide, and it had 9 feet water on its shoalest part. At a ship's length from it the soundings were 20 fathoms, and close to it 12, 10, and 5 fathoms. Horsburg says that this ship struck on this shoal in April 1832, and that Mr. Harris made it at the same time in $1^{\circ} 4' S.$ and $106^{\circ} 37' E.$

H.M.S. *Rifleman* in December 1863 was employed with her tender for three days in searching for the Vega shoal, but without success. A small rocky patch with 7 fathoms water over it, and 13, 15 and 17 fathoms all around, was discovered in lat. $1^{\circ} 5' 30'' S.$, long. $106^{\circ} 35\frac{3}{4}' E.$ Bad weather compelled the *Rifleman* to relinquish the search.

Current.—A southerly current, varying from 1 to $1\frac{1}{2}$ knots an hour, was experienced the whole time the *Rifleman* remained in this vicinity.

HAWKINS, or WILD PIGEON SHOAL, we have no account of, and its position is also very doubtful. On the chart three positions are given; the first in lat. $1^{\circ} 8' S.$, long. $106^{\circ} 43' E.$; the second in lat. $1^{\circ} 9'$, long. $106^{\circ} 41\frac{1}{2}'$, with 2 fathoms marked against it; and the third in lat. $1^{\circ} 11'$, and the same longitude as the second position.

DEVA REEF.—The ship *Deva*,* at 5h. 30m. p.m. 23rd May 1859, struck on a coral reef in about lat. $1^{\circ} 9' S.$, long. $106^{\circ} 52' E.$ The reef appeared to be about 60 yards in extent, N.E. and S.W., about 30 yards broad, with $3\frac{1}{2}$ fathoms on it, and 15 and 17 fathoms close to. At daylight the next morning two reefs were in sight from the masthead; the one the vessel grounded on, and the other, which was much the largest, considerably to the westward.

CAUTION.—Probably the *Deva* and the *Celestial* are the same reefs,—but until examined this neighbourhood must be navigated with great caution, and the whole group of the Vega, Hawkins, *Celestial*, and *Deva* shoals should be given a berth of 9 or 10 miles.

SOUNDINGS.—The dangers northward and north-westward of Gaspar island are, for the most part, steep-to, and have a depth of 17 to 20

* From the report of J. Pollock, Master of the ship *Deva*, to Underwriters at Lloyds, 21st January 1860.

fathoms around and between them ; in the vicinity of those under the shore of Banka, the depth decreases to 12 or 14 fathoms.

DIRECTIONS from GASPAR STRAIT to the NORTHWARD.—

Most vessels bound to the northward from Gaspar strait, prefer passing eastward of Gaspar island, which is the safest route ; but some vessels, especially when bound to Singapore by Rhio strait, prefer the less safe but more direct route through the shoals westward of that island.

To proceed Eastward of Gaspar Island with a fair wind, a vessel should, as before directed in pages 113, 132, 184, steer about N. by E. $\frac{1}{4}$ E. if she passed through Macclesfield channel, or about N. by W. or N.N.W. if she passed through either Stolze or Clements channels, to pass 2 or 3 miles eastward of Gaspar island, and 5 or 6 westward of Canning rock. Having passed Gaspar, steer to the northward until it bears S. $\frac{3}{4}$ W., upon which bearing it should be kept as long as it can be seen. A N. $\frac{3}{4}$ E. course from Gaspar will lead midway between Catharine reef and Pratt rock, and if Gaspar be brought on the opposite bearing soon after it is passed, it will afford a good opportunity to judge of the effect of the current, by noting the course that must be steered to preserve the proper bearing of the island ; and will also assist in forming a judgment as to the proper course to steer to pass midway between Catharine reef and Pratt rock, after Gaspar island has sunk below the horizon, and will no longer serve as a guide.

If the wind should prevent a direct course from being steered, Gaspar island should not be brought westward of N.N.W., until the vessel is northward of the Akbar shoal ; and, after Gaspar is passed, it must be kept westward of South, in order to avoid the rock marked doubtful, the Belvedere, and the Magdalen shoals.

To proceed Westward of Gaspar Island between the Glassa rock and Tree island—from a position midway between them, steer to the northward until the peak of Gaspar island bears S.E. ; when a N.W. course will lead between the Chrysolite rock on the port hand, and the rock marked doubtful on the starboard hand ; but great caution must be observed, as there is a deficiency of soundings on the chart in the localities of these dangers. When Brekat point bears S. by W., or the Saddles S.W. by S., a vessel will be westward of the Warren Hastings and Belvedere shoals, and a N. by W. or N.N.W. course, according to the set of the tide, will lead westward of the Magdalen and Newland reefs, and eastward of the Actæon rock. When nearing the Actæon rock, the soundings should not be shoaled under 20 fathoms ; after passing it, a course may be shaped for Toty island.

If circumstances prevent a straight course from being steered, take care

not to bring Tree island to the south of S. by W., to avoid the Chrysolite rock. Gaspar island, when 3 or 4 miles distant, kept between S.E. and S.E. by E. $\frac{1}{4}$ E., will keep the vessel clear of the rock marked doubtful, and of the Warren Hastings reef.

Brekat point bearing S. by W., or the Saddles S.W. by S., leads westward of the Warren Hastings and Belvedere shoals, and Gaspar island S.E., leads 3 miles eastward of the Dutch shoal; but when westward of the Warren Hastings and Belvedere shoals, it will be wise to edge away to the northward—always carefully guarding against tide and currents—taking care not to bring Gaspar peak to the south of S. by E. $\frac{1}{2}$ E., to avoid the Magdalen reef.

If proceeding between Brekat Point and Tree Island, the point may be passed at the distance of 3 or 2 miles, and the island at a mile; then proceed to the N.N.W., taking care not to bring Tree island to the south of S.E. by S., to avoid the south-west end of Warren Hastings reef. Brekat point bearing S. by W. $\frac{1}{4}$ W., leads clear of the north-west extreme of that reef; and bearing S. $\frac{1}{2}$ E., leads eastward of the reported positions of the Columbian and Dutch shoals. When Brekat point bears S. $\frac{1}{2}$ W., a northerly course may be steered, proceeding as before to pass eastward of the Actæon rock.

Horsburgh states that Captain R. Scott in the *Warren Hastings*, after passing Brekat point, coasted along to the northward, keeping generally in 11 or 12 fathoms water, without any appearance of danger, but a good mast-head look-out was kept. The passage, however, near the Banka coast is so beset with dangers, whose exact positions are unknown, and there may be others of which we at present know nothing, that we would strongly advise vessels to give this exceedingly dangerous coast a wide berth, especially as nothing is to be gained by approaching it. At page 141 directions are given to proceed along this coast to Tanjong Riah.

DIRECTIONS to approach GASPAR STRAIT from the NORTHWARD.—In consequence of the northern entrance of Gaspar strait being so near the Equator, the winds, even in the strength of the monsoons, are very uncertain, producing a corresponding uncertainty in the direction and force of the tides and currents. A vessel approaching the strait from the northward will, therefore, have to be principally guided by the winds and currents which she may herself fall in with, rather than by relying upon experiencing those which are here mentioned as most likely to be met with at certain seasons.

In the early part of the monsoon, that is from the middle of November to the middle or end of December, northerly and north-westerly winds are said to prevail, but Horsburgh mentions an instance of vessels meet-

ing with strong West and W.S.W. winds in December. As the monsoon gathers strength and becomes more regular, the wind draws to the eastward of North, and late in the monsoon, easterly and south-easterly winds are often met with between Banka and Billiton.

Horsburgh remarks that vessels intending to pass through Gaspar strait will, probably, find the southerly current usually found running in the south-west part of the China sea during the northern monsoon, set to the south-eastward as the distance is increased to the southward of the line, and it also appears from other sources, that it is most necessary to be prepared to meet a south-easterly current, about the entrance of this strait, particularly if the wind be westward of North; but a vessel can be only guided by a correct knowledge of her position, and by the winds and currents she may herself experience, in forming a judgment as to the best means of avoiding the many outlying dangers at the northern entrance of Gaspar strait.

The following Directions are chiefly from the Java Guide, page 316,—but in thick weather it will always be an anxious time for the navigator whilst approaching Gaspar strait, for unless good sights can be obtained, he can never be certain of his exact position, and we would again strongly advise him under such circumstances to steer for Banka strait, where the soundings on the edge of the bank extending from the Sumatra coast will enable him to proceed with safety, although he may be quite unable to distinguish the land.

Vessels returning from Singapore or China early in the northern monsoon, and intending to go through Gaspar strait, prefer the Macclesfield channel, passing between Toty and Docan islands; but it is better to go 12 or 14 miles to the eastward of the latter, and even more, when the wind is easterly; but early in the monsoon the wind is generally North or N.W.

Having passed Toty island, steer about S.E. by E., so as to get on the meridian of Gaspar island before reaching the parallel of $1^{\circ} 50'$ S. Gaspar is visible in clear weather at a distance of 30 miles. Directly it is seen steer towards it on a S. $\frac{3}{4}$ W. bearing, and passing eastward of it steer to the south-westward for the entrance of the Macclesfield channel.

The above directions apply only to vessels returning from China early in the monsoon. In general, and especially returning late in the monsoon from China, when south-east and easterly winds are often met with between Banka and Billiton, it will be better to go 10 or 12 miles to the westward of St. Barbe island, and endeavour as soon as possible to get on the meridian of Gaspar island, but not to the westward of it when near

the parallel of the Catherine reef, which should never be passed at night. When Gaspar is seen, bring it on a S. $\frac{3}{4}$ W. bearing and proceed as before.

Returning from China late in the monsoon, S.S.W. winds are often met in the southern part of the China sea, and oblige vessels to pass between the islands near the west coast of Borneo. If this should happen in May or June, it would be very tedious to get to the southward ; in such case, steer for the north-western end of Billiton, and pass through Stolze channel.

CHAPTER V.

CARIMATA STRAIT.

VARIAION $1\frac{1}{4}^{\circ}$ EAST in 1866.

GENERAL DESCRIPTION.—Carimata strait, the easternmost of the channels leading from the Java sea into the China sea, is bounded on the eastern side by Carimata, Soruetou, and the other islands adjacent to the southern part of the west coast of Borneo; and on the western side by the east coast of Billiton, with the adjoining islands and dangers. It is often used by vessels from Malacca strait proceeding to China by the eastern passages, but although much broader than either Banka or Gaspar straits, it is not nearly so much frequented as either of those channels by vessels proceeding to and from China by way of Sunda strait. It is, however, not unfrequently used by vessels returning from China, which, from the effects of winds or currents, find it difficult to get to the westward.*

This strait has not been properly surveyed. Captains Ross and Maughan, of the Indian Navy, determined the positions of many of the dangers on each side of it, but much of the information which we possess has been derived from accounts furnished by vessels that have passed through it. In using it, therefore, a vessel must keep a good look-out, and be as far as possible prepared to meet with unknown dangers.

Beside the Main channel, limited to the north-eastward by the islands of Soruetou and Carimata, and to the south-westward by the Montaran islands and Billiton, there are several other channels between the numerous islands lying eastward and north-eastward of Carimata, between it and the Borneo coast, through which vessels have occasionally passed. One of these, known as the Inner channel, and situated between the islands of Panambungan and Mayang, is much frequented by vessels working through the strait against the monsoon, for a regular tide will be found near the Borneo coast, which enables them to work through the Inner

* See Chart of Carimata strait, No. 2,160; scale, $m = 0.14$ of an inch.

channel when it is quite impossible to work through the Main channel against a strong monsoon, and a continuous rapid current setting to leeward.

CURRENTS and TIDES.—The currents in Carimata strait appear to set mostly to the southward in the northerly monsoon, for many ships have found it almost impracticable to beat to the northward in that season. Captain Ross, in the *Discovery*, found a constant southerly current in this strait; on February 15th he was off Pulo Mankap, and from hence continued beating along the west coast of Borneo, and afterwards on the south and west sides of Carimata and its adjacent islands until March 16th, when he got round the western end of Soruetou. In the southerly monsoon it does not appear to be so difficult to get to the southward, for there are regular tides along the west coast of Borneo, and also off the east coast of Billiton in this season, which seem to extend in some degree across Carimata strait, the flood apparently setting 12 hours to the north-westward, and the ebb about 12 hours in the opposite direction; the rise of tide, as experienced by Captain Ross, was about 9 or 10 feet, at full and change of the moon.

ISLANDS AND DANGERS SOUTHWARD OF BILLITON.

A description of that portion of the dangers southward of Billiton, which lie contiguous to Gaspar strait, is given at page 125. The following islands and dangers lie nearer Carimata strait, and are important to vessels approaching it from the southward.

KEBATON, or Shoe island,* or Pyramid, in lat. $3^{\circ} 47\frac{1}{2}'$ S.; long. $108^{\circ} 6'$ E., is small, about half a mile in extent, and may be seen 18 or 19 miles from the ship's deck in clear weather. A large White rock lies $2\frac{1}{2}$ miles to the south-westward of it; and W. $\frac{1}{4}$ S. 4 miles from the island, is the Zephyr rock, having only 7 feet water over it, with soundings of 16 fathoms at a short distance from it. A sunken rock is placed on the chart at 8 miles N.W. by W. $\frac{1}{2}$ W. from Shoe island.

KARANG KAWAT or Grace reef, lies N. by E. $\frac{1}{2}$ E. $2\frac{3}{4}$ miles from Shoe island, and in that direction extend $2\frac{1}{2}$ miles. Some of the rocks are reported as being above water; 11 fathoms surround them.

CAUTION.—A ship ought never to attempt the passage inside Shoe island, except in very clear and favourable weather.

HEROINE SHOAL.—Horsburgh gives the position of this shoal as lat.

* Shoe island and its adjoining white rock are the Bird island and White rock, which were formerly thought to be much farther to the eastward.

3° 33½' S., long. about 107° 52' E. On the Admiralty Chart it is placed in lat. 3° 37' S., long. 107° 49' E.; its exact position is, however, doubtful. It is reported to be an extensive shoal with breakers upon it. It was passed at about the distance of 1½ miles, when Two-peaked mountain on Billiton bore N.N.W.; a small island N.E. by E. ½ E.; and Shoe island, seen from the mizen-shrouds, S.E.

KATAPANG ISLAND, in lat. 3° 23' S., long. 108° E., is small, about a third of a mile in diameter, and surrounded by a reef. Around it are soundings of 8 and 9 fathoms, and the same depths between it and the shore, where, however, no vessel should venture.

SOUTH, EAST, AND NORTH COASTS OF BILLITON, WITH THE ADJACENT ISLANDS AND DANGERS.

The whole of these coasts are but very imperfectly known, but it is certain that they are fronted by many dangers, and vessels are strongly advised to avoid them. The following information is principally from Horsburgh, from passing vessels, and from the Admiralty charts:—

SOUTH COAST OF BILLITON.—From Krawang point, the south-west extreme of Billiton, the coast trends to the eastward for 2 or 3 miles, and then turns sharply to the north-eastward, forming a deep bay, the eastern horn of which is the most southern point of the island, and is distant 21 miles eastward from Krawang point. This bay is named Telok Batoh, which in the Malay language signifies rocky bay, and it appears from the chart to be full of dangers, with others extending some 2 or 3 miles outside its chord. Southward and westward from the eastern horn of the bay are some small islets lying within the margin of the reef which projects from the point.

TIDES.—The *Warren Hastings*, in May, passed between the south-east end of Billiton and the reefs in the offing, and found regular tides setting nearly East and West, from 1½ to 2 miles per hour.

EAST COAST OF BILLITON.—From the eastern point of Telok Batoh bay, the coast trends East-northerly for 6 or 7 miles, to the south-east point of the island, 9 or 10 miles north-east of which is a prominent point named Sakapar. Between these two latter points is a bay, in which are several islands; and fronting it are the islands of Serukat, Meray, and many others not named in the chart. N. by E. ¼ E. 17 miles from Sekapar point is Mangar point, having a hill upon it, the coast between forming a bay 2 or 3 miles deep. Northward of Mangar point is another small bay, and 4 or 5 miles distant from it is a point from which the coast rounds away, and forms the north-east shore of the island.

The whole east side of Billiton is fronted by several groups of small islands, most of them being surrounded with or connected by rocks, sands, and shoals. There is a large range of these islands in about lat. $3^{\circ} 13' S.$, through which the *Warren Hastings* passed, between a long island to the eastward and a small round one to the westward, having extensive reefs projecting from them. The soundings were pretty regular in the channel between the reefs, decreasing to 6 and $5\frac{1}{2}$ fathoms on the western side, and increasing to 13 fathoms abreast the reef projecting from the easternmost island. There are nine islands to the eastward of this passage, and a great number on the west side towards Billiton.

The islands and dangers adjacent to the east coast of Billiton are, however, so imperfectly known, that it is not possible to give any accurate description of them here. They do not lie in the track of ordinary navigation, and if a vessel ventures near them she must do so with caution and judgment, and without placing too great confidence in the chart.

SCHARVOGEL ISLANDS are a group of seven islands, the easternmost of which by the chart is in lat. $3^{\circ} 18' S.$, long. $108^{\circ} 34' E.$ Between the northern island and the Meray group, is a channel 3 or 4 miles wide, with 5 to 9 fathoms water in it. Each of the islands appears to be surrounded by a reef.

NORTH-EAST and NORTH COASTS of BILLITON.—From the north-east point of Billiton the coast rounds gradually to the north-west, and then takes a general direction about N.W. by W. to the N.W. Hook or point. Between some of the points along the coast are bays 1 or 2 miles deep; but in two places the land falls farther back, forming what appear to be the entrances of rivers. The aspect of the coast is high, uneven land, visible in clear weather 24 or 25 miles off.

Adjacent to these coasts are several islands and dangers, which, like those lying off the other coasts, are, for the most part, very imperfectly known.

PIGEON ISLAND, lying 3 or 4 miles off the coast, with the north-east extreme of Billiton bearing S.E. by S., and the north-west hill on Tokokemo island E. by N. $\frac{1}{2}$ N., distant 21 miles, is very small, and surrounded by rocks or patches of reef, which in directions north-west and south-east from the island, appear to extend more than a mile. Around are soundings from 9 to 16 fathoms.

About N.E. by E. $\frac{1}{2}$ E. 5 miles from the island, a small sand-bank was seen by the *Bellhaven* in 1857, probably at high water.

TWO-FATHOMS PATCH.—A small rock or patch with 2 fathoms water over it is placed on the chart N.N.E. 7 miles from Pigeon island.

Around it are soundings of 19 and 20 fathoms, with 27 and 24 fathoms at 3 or 4 miles to the north-eastward.

There are other islets and dangers between Pigeon island and the N.W. point of Billiton, some of them at 3 or 4 miles from the shore. Their exact positions, however, are not known, and the mariner, if he approaches this shore, which there appears to be no good reason for doing, must do so with caution.

ISLANDS AND DANGERS IN THE FAIRWAY BETWEEN BILLITON AND BORNEO.

DISCOVERY WEST BANK, in lat. $3^{\circ} 39'$ S., long. $108^{\circ} 45'$ E., was examined by Captain Ross, I.N., in the surveying ship *Discovery*. It is of coral, about a mile in extent north and south, and elevated about 15 feet in the centre at low water. The *Discovery's* boat could not land on it, being surrounded by a coral reef, on which the surf broke high. About a mile to the eastward of this bank, the *Discovery* anchored in 20 fathoms, soft mud, and to the northward and westward of it the depths are 16 and 17 fathoms.

DISCOVERY REEF, in lat. $3^{\circ} 36\frac{1}{2}'$ S., long. $108^{\circ} 50\frac{1}{2}'$ E., and distant $5\frac{1}{2}$ miles N.E. by E. from the last-mentioned bank, is not a mile in extent, with a few rocks above water and high breakers projecting round them. The *Discovery* passed about a mile to the southward of this reef, in 19 fathoms water; and when it bore North, a mile distant, the western bank was just in sight from the main top gallant yard, bearing W.S.W.

DISCOVERY EAST BANK,* in lat $3^{\circ} 33'$ S., long. $109^{\circ} 12\frac{1}{2}'$ E., extends about half a mile north and south, is elevated in the centre about 15 or 20 feet above low water mark, and has some coarse grass growing on it. The whole of the bank consists of small white coral, which may easily be mistaken for sand. The *Discovery* at anchor about half a mile to the eastward of it had 20 fathoms water, and about 5 miles East of it 25 to 29 fathoms.

LAVENDER BANK, in lat. $3^{\circ} 25\frac{1}{2}'$ S., long. $108^{\circ} 59'$ E., was discovered by Captain T. Lavender, of the ship *Roman*, who passed it bearing East about a quarter of a mile distant, in soundings from 20 to

* From the following remarks in possession of Captain Stephen Stocker, R.N., who was mate of H.M.S. *Hecate* in 1813, it would appear that this bank was discovered by that vessel:—"Steering to the southward out of Carimata strait, we discovered a "dry sand bank 12 or 13 feet above water in about lat. $3^{\circ} 40'$ S., long. $109^{\circ} 4'$ E. "Passed about three-quarters of a mile eastward of it, and had soundings of 21 to 25 "fathoms."

26 fathoms. It extends north and south about three-quarters of a mile, but is not more than 200 yards in breadth, having breakers along the eastern side, where the depth did not appear to exceed 2 feet. When the *Cirencester* sand-bank was seen from the fore-yard bearing about N. by W. to N. by W. $\frac{1}{2}$ W., the shoal bore S. by W., 2 or 3 miles.

CIRENCESTER SAND-BANK, in lat. $3^{\circ} 17' S.$, long. $108^{\circ} 59' E.$, is about a third of a mile in extent N.N.W. and S.S.E., and not above 100 yards in breadth, part of it being a bank of white coral, overflowed in the middle at high tide, which then gives it the appearance of two small sandy patches, the larger being to the southward. The depth of water increases towards the bank, there being 25 fathoms close off the north end, 32 fathoms off the south end, and 35 fathoms about three-quarters of a mile to the westward; with a good look out it may be seen from the mast-head about 8 miles at low water, but probably not above 3 or 4 at high tide. Two miles eastward of the bank the *Cirencester* had very irregular soundings, from 16 to 20 fathoms, changing almost at every cast of the lead. When Captain Ross examined this bank he found two spars erected upon it, probably placed there by some persons who had been shipwrecked.

OSTERLY NORTH SHOAL, in lat. $3^{\circ} 17' S.$, long. $108^{\circ} 41\frac{1}{2}' E.$, is a coral bank about $1\frac{1}{2}$ or 2 cables in extent, and very narrow, with a small patch of dry coral on its southern part. The *Discovery* anchored in 11 fathoms, soft ground, with this shoal bearing East 2 miles, when the boat had from 5 to 7 fathoms rocks on another shoal, bearing S. $\frac{1}{2}$ W. from the ship about a quarter of a mile. From the *Discovery* the extremes of the Schavogel group bore W. $15\frac{1}{2}^{\circ} S.$ to W. $15^{\circ} N.$, the nearest island distant about 8 miles, and a high distant hill N.W.

OSTERLY SOUTH SHOAL.—When the *Discovery* was anchored in the above position, breakers were seen from the mast-head bearing S.S.E. distant about 4 miles, on what is named Osterly South shoal. Many eddies were also seen around.

CIRENCESTER ROCK, in lat. $2^{\circ} 54\frac{1}{2}' S.$, long. $108^{\circ} 56' E.$, was seen by the *Cirencester* on the same day that she discovered the sand-bank described above. The least depth found upon it was 2 fathoms at low water, and there is probably $3\frac{1}{2}$ fathoms on it at high tide; close around the soundings were 17, 16, and 15 fathoms. The shoal is narrow, and not more than 100 yards in length, north and south. It was not discovered by the boats sounding for it until the rocks were seen under the bottom.

MONTARAN ISLANDS, lying off the north-east part of Billiton, consist of three straggling groups, which, with the many dangers that lie

near them, are very imperfectly known, and appear to be most inaccurately laid down upon the chart, for it is not possible to get the bearings of the different objects said to have been taken upon or near several of the dangers to agree. The navigator is, therefore, cautioned to be very vigilant when near these islands, or, what is better, to give them a wide berth.

The *Warren Hastings* of Calcutta found a safe passage between two of the groups of the Montaran islands, and had soundings 17 to 26 fathoms; when the extremities of the islands bore from E. $\frac{1}{2}$ N. to S.W. by W., distant from the nearest 4 or 5 miles, a long reef of sand and breakers bore from N.W. to W.S.W., about three-quarters of a mile, near to which she anchored in 7 fathoms in the night.

TOKOKEMO, the largest and highest of the Montaran islands, has a high hill on each extreme, and being low in the middle, appears like two islands till within 8 or 9 miles of it; but it cannot be mistaken when a vessel is 17 or 18 miles to the northward, as none of the low islands near it are seen at that distance.

Close to the north point of this high saddle island of Tokokemo lies an islet covered with bushes, and they are united by a reef which extends about $1\frac{1}{2}$ miles to the northward; a reef projects also about half a mile from the south point of the island. A reef lies 6 miles N.W. $\frac{1}{2}$ N. from the north end of Tokokemo;* and about a mile westward of Tokokemo is a small round island with a white beach, surrounded by a reef.

WEST GROUP.—About $2\frac{1}{2}$ miles S. by E. from Tokokemo are three low islands, named West group, with apparently much broken water about them, and a dry sand-bank about 2 miles to the westward of them; there is also a high white sand-bank about 4 miles south-eastward of them.

To the E.S.E. of Tokokemo, and bearing W.S.W. from East island, and W. $\frac{1}{2}$ N. from the low flat island of the Middle group, lies a dangerous reef of rocks, very little above water, and which appeared very shoal near the islands. All this part adjacent to these islands seems dangerous, and a ship should not borrow nearer than to bring Tokokemo W. $\frac{1}{2}$ S., or she may get into shoal water.

THE MIDDLE GROUP consists of four or five islands, lying from 6 to 12 miles to the eastward of the West group. The southernmost island is in lat. $2^{\circ} 36'$ S., and when approached by the *Fox* frigate, it appeared to

* Mr. Hall, commander of the barque *Catharine*, when passing this island with its centre bearing S.E. $\frac{1}{2}$ S., and with the beach visible half way down the rigging, observed a coral reef near the ship, which appeared connected with the island, and to have not more than 5 feet water upon it.—Naut. Mag. 1841.

be inhabited, and the water very shoal around,* for the Malays were observed pushing a boat along with poles, although 3 miles off the islands; other boats were also seen, likewise some people upon the shore.

EAST ISLAND, in lat. $2^{\circ} 30\frac{1}{4}'$ S., long. $108^{\circ} 49\frac{1}{4}'$ E., by Captain Ross, I.N., is about a third of a mile in extent north and south, and surrounded with a high sandy beach, as is likewise the next adjoining small island.

A SAND-BANK lies S.E. by E. $\frac{3}{4}$ E. about 4 miles from East island. About a hundred yards all round this bank the depths were from 10 to 18 fathoms, shoaling suddenly towards it. The *Discovery's* boat went over it, and had very irregular soundings, from 4 feet to 5 fathoms, and in the centre of the bank there was a coral rock 3 feet above water. Shoal water was observed to extend about $1\frac{1}{2}$ miles W.N.W. and E.S.E. The following are the bearings taken:† the small and nearest island S.S.W. $\frac{1}{4}$ W.; the two hills on Tokokemo island W. $\frac{1}{2}$ S., and W. $\frac{1}{2}$ S. nearly; and two small distant hills, supposed to be on Billiton, S. $63\frac{1}{2}^{\circ}$ W., and S. $65\frac{1}{2}^{\circ}$ W.

CATHERINE, or EVANS REEF.—The dangers near East island seem as yet to be but imperfectly known. The ship *Catherine*, Captain Evans, at 2h. 15m. p.m. struck on a ledge of rocks, with East island bearing W. $\frac{1}{2}$ N., distant 8 miles, and Carimata peak N. 4° W. This reef, which is formed of sharp coral rocks, extends N.W. and S.E. a cable's length, and the least water found on it was 2 fathoms. While aground, soundings were obtained in different directions: they were 4 to 9 fathoms about 100 yards north-west of the ship, and to the south-east, a little less than a cable distant, no bottom with 20 fathoms; at half a cable 9 fathoms; and a boat's length nearer the ship, $2\frac{1}{2}$ fathoms. Though a strong current was setting to the southward, there was no appearance of broken or discoloured water, nor any indication which would cause a careful navigator to apprehend danger. Captain Evans places the reef in lat. $2^{\circ} 31\frac{1}{2}'$ S., long. $108^{\circ} 57'$ E.

CORCYRA SHOAL.—Horsburgh remarks that "the *Corcyra*, Captain Walison, in August 1858, discovered a shoal of 15 feet water, about

* It appears to have been upon one of the reefs off these islands that the *Abercrombie* was lost, a fine ship of 1,200 tons burden, belonging to Bombay. She was steering N.W. by N. in the night among the dangers that lie off the east coast of Billiton although land was seen bearing N.W.; she struck on a reef with dry rocks on it, extending about a mile to the north-west; the Journal states it to be in lat. $2^{\circ} 29'$ S., the centre of Billiton bearing S.W. by S.—Horsburgh.

† Horsburgh remarks that, "these bearings would place the shoal to the westward of East island, whereas it is stated to be 4 miles, S. $64\frac{1}{4}^{\circ}$ E. from that island." It is very probable that the islands are not placed on the chart in their correct relative positions.

half a cable's length in circumference, with Round hill on Billiton bearing S. 57° W., and the northernmost small island of Tokokemo, just open of the large one N. 61° W.;" but these bearings will not lay down upon the chart.

ONTARIO REEF, the centre of which is in lat. $2^{\circ} 1\frac{1}{4}'$ S., long. $108^{\circ} 39'$ E., is very dangerous, as it lies in the direct tract formerly recommended to ships when passing between Soruetou and Billiton. It is composed of sharp spiral rocks, with the tops of some of them dry at low water spring tides; but the small break against their sharp points cannot be distinguished from the topping of a common sea; and the shoal is steep-to, having 18 and 19 fathoms at a ship's length from the rocks. From the wreck of the *Ontario* the north-eastern end of the Quoin (on the western part of Soruetou, was just shut in with the western end of Soruetou; the east end of Soruetou bearing N.N.E. was open about a quarter of a point from the west end of Carimata. The soundings are no guide in the approach to this dangerous shoal, there being 23 and 24 fathoms close to it on the north and east sides, 18 to 25 fathoms nearly close to the rocks on the west side, and 25 fathoms, clay, at the distance of a cable's length.

This shoal was examined by Captain Ross, I.N., in the surveying ship *Discovery*, who found it half a mile in extent W.N.W. and E.S.E.; the boat had $1\frac{1}{2}$ fathoms on it about high water, and in many places the depth appeared to be less. When at anchor in 21 fathoms, on a mud bottom, with the shoal bearing W. by S., distant a mile, the altitude of the highest part of Soruetou was $39' 30''$ *; the eastern end of Soruetou N. 24° E.; the highest land of Carimata N. $32\frac{1}{2}^{\circ}$ E.; and one of the Montaran islands, visible from the main-top, S. $6\frac{1}{4}^{\circ}$ W.

SUPPOSED ROCK.—There is said to be a coral rock with 3 fathoms water over it at 3 miles westward of the Ontario reef.

RIVAL REEF, we have no account of. It is marked on the chart with $5\frac{1}{2}$ fathoms over it, rocky bottom, in lat. $1^{\circ} 47'$ S., long. $108^{\circ} 15\frac{1}{2}'$ E.

FLORENCE ADELAIDE REEF.—The British ship *Florence Adelaide*, bound from Cardiff to Singapore in 1863, was reported to have been wrecked on a supposed coral reef, lying in about lat. 2° S., long. 108° E. The reef had 16 feet water on it in the place where the vessel struck, but its extent and the least depth over it was not ascertained.

SORUETOU ISLAND, about 6 miles long east and west, 2 miles wide, 1,400 feet high, and visible 28 or 30 miles off, forms the north-eastern limit of the broad main channel of Carimata strait. The western point of the island is in lat. $1^{\circ} 42\frac{1}{2}'$ S., long. $108^{\circ} 39\frac{1}{2}'$ E., and on it is a

* Horsburgh.

hummock, which has been mistaken for a small island, and called the Quoin from its appearance. About 2 or 3 miles off the west end of the island the depths are 20 to 26 fathoms.

Horsburgh says that "breakers were said to have been seen from the mast-head of the ship *Aurora*, bearing S. by W. $\frac{1}{2}$ W., distant about 3 miles, when the eastern extremity of Soruétou bore E. by N. $\frac{1}{4}$ N., the other extreme being obscured by clouds."

Water.—At a sandy beach on the south side of Soruétou, and near the east point, there is a good watering place, but high tide is required for a large boat to get over a reef, near to which there is anchorage in 7 fathoms, mud. It is said, however, that fresh water can only be got at the west end of the island, at the foot of a hill of moderate height, where a ship may anchor in 10 fathoms.

CARIMATA ISLAND lies north-eastward of Soruétou, from which it is separated by a narrow channel. It is about 11 miles in extent east and west, 7 miles north and south, and near its centre is a peak rising to an elevation of 2,000 feet,* which may be seen at the distance of about 45 miles. On the south-west end of the island are some hot springs.

Reefs and dangers extend off the east and south coasts of Carimata; and at $6\frac{1}{2}$ miles S.S.E. from the south point of the island is a gravel patch, having 4 fathoms water over it. Two rocks above water with others below the surface appear to lie 3 or 4 miles off the middle part of the west coast; and off the north-west point of the island are numerous islets and rocks, the outer one of which, Tongado island, is 3 miles westward of the point.

The channel between Soruétou and the reef which extends from the south coast of Carimata is about 2 miles wide, with depths of 10 to 17 fathoms; but no object is to be gained by using it.

JAMSETTI REEF, with 19 feet water over it, lies 7 miles N. by W. $\frac{3}{4}$ W. from the north point of Carimata island, and N.E. $\frac{1}{2}$ N. $10\frac{1}{2}$ miles from Tongado island.

LEEMA ISLES are a group of small islets lying North about 18 miles from the northern side of Carimata; near them the soundings are 12 to 14 fathoms.

WELLESLEY SHOAL is said to lie in lat. $1^{\circ} 18' S.$, long. $108^{\circ} 34\frac{1}{2}' E.$, but its position is doubtful.

CRESCENT SHOAL, also of doubtful existence, is said to lie in lat. $1^{\circ} 10' S.$, long. $108^{\circ} 38' E.$

* The late Lieutenant Raper, R.N., made it 2,986 feet.

GREIG SHOAL was discovered by Captain William Greig, of the ship *Lord Minto*, who found it to extend from lat. $0^{\circ} 52'$ to $0^{\circ} 58'$ S., long. $108^{\circ} 37'$ E.; the longitude, however, cannot be relied upon as being correct. Five fathoms water were found within the extent given above, but on the extremes of the shoal the vessel was often in nearly the same depth of water as she was drawing, 13 feet, and this was in steering between much shoaler spots, with the body of Carimata then seen from the deck, bearing between S.S.E. $\frac{1}{2}$ E., and S.E. by S.; the least water found was 12 feet.

WEST COAST OF BORNEO; SAMBAR POINT TO MASIEN TIEGA ISLANDS, WITH THE ADJACENT ISLANDS AND DANGERS.

The southern part of the west coast of Borneo, from Sambar point its south-west extreme to abreast of the Masien Tiega islets, is very imperfectly known. At present it is only visited by small vessels, mostly owned and commanded by Chinamen or Malays connected either with the Dutch settlements in Borneo or Java, or with Singapore.

Sambar point is in about lat. $3^{\circ} 3' 20''$ S., long. $110^{\circ} 15'$ E., and Mount Minto in $2^{\circ} 14'$ S., $110^{\circ} 3'$ E., and between them the coast falls back and forms two bays. Mount Minto is upon the north point of the northern bay, and about 16 miles S.E. by E. $\frac{1}{2}$ E. from it is a high peak. The islands of Mankap, Laag, Kumpal, and some smaller ones, together with several dangers, lie off this part of the coast, and are described in page 165.

N. $\frac{1}{2}$ W., distant 22 miles from Mount Minto point is Bree point, the coast between forming a bay 5 or 6 miles deep, in which are several small rivers. Close to the northward of Bree point is the Pawang river, which has two entrances, separated by an island 3 or 4 miles in breadth. At the mouth of the southern entrance is a small islet named Odang, and at the mouth of the northern entrance there is another islet, named Pajong.

From the entrance of the Pawang the coast trends with an irregular outline in a general North direction for about 45 miles, to the entrance of the large river Simpang. On this part of the coast are several small rivers, and about midway between the Pawang and Simpang are the islets Sepadian, Tjampedak, Dato, &c., with the islands of Joanta and Batoang 7 or 8 miles in the offing. About 7 miles southward of the entrance of the Simpang is the island of Palintoan, lying close to a point of the coast, inside of which on a small river is the town of Pambarawang. Two or 3 miles southward of Pambarawang is the town of Succadana.

There is good anchorage in 3 or 4 fathoms in the roadstead off these towns, with a group of small islands to the southward.

Horsburgh remarks that the coast above described is low land, and that it has seldom been approached under 12 or 10 fathoms, being fronted by islets or rocky ground in some parts.

From the entrance of the Simpang river, the coast trends for about 40 miles in a E.N.E. direction to a point about 4 miles north-eastward of the Masien Tiega islands. On this part of the coast are several other islands, and separated from it by a very narrow channel, is the large island of Mayang, which is principally low land, but near its south-western end is a high hill, Mount Marang; and near its north-western end a long range fronting the sea, named Mount Mayak.

HECTOR BANK.—Dangerous patches extend many miles to the southward of Sambar point, the south extreme of the coast just described, the most southern of which is the Hector bank, which is a $3\frac{1}{2}$ -fathoms patch of doubtful position, but placed on the chart in lat. $3^{\circ} 46' S.$, long. $110^{\circ} 8' E.$ Around it are from 6 to 10 fathoms.

FOX SHOAL is shown on the chart as two rocks awash N.W. by W. $\frac{1}{2}$ W. and S.E. by E. $\frac{1}{2}$ E. of each other, about $1\frac{1}{2}$ miles apart, with a large patch with only 2 fathoms water over it, to the north-eastward of them, and 9 to 19 fathoms close to on their west and south sides. The westernmost rock is in lat. $3^{\circ} 32' S.$, long. $110^{\circ} 7\frac{3}{4}' E.$

ARUBA SHOAL, taken from the Dutch chart, is said to lie 3 or 4 miles N.E. by E. from the Fox shoal, and to have 3 fathoms water over it.

CLEMENCIA REEF, in lat. $3^{\circ} 24' S.$, long. $110^{\circ} 7\frac{3}{4}' E.$, is nearly dry; around it are 7 to 17 fathoms.

From the Clemencia reef, shoals appear to extend all the way to Mankap island, and vessels should be very cautious not to get too near them. Between Fox shoal and Hector bank there is a good channel by keeping between lat. $3^{\circ} 36'$ and $3^{\circ} 42' S.$; but when the vessel's position is not correctly known it is advisable to pass to the southward of the Hector bank.

SOUNDINGS.—Horsburgh says, that although the bottom near and among these shoals is generally a mixture of red and green clay, with mud, yet the soundings are very irregular, with overfalls, making it prudent not to come under 15 or 16 fathoms towards them.

A **DOUBTFUL ROCK** is marked on the chart in lat. $3^{\circ} 25\frac{1}{2}' S.$, long. $109^{\circ} 41' E.$, or S.S.W. 16 miles from Oliviera reef.

OLIVIERA REEF, from a Dutch chart of 1842, lies W. by S. $24\frac{1}{2}$ miles from Mankap island, or in lat. $3^{\circ} 10' S.$, long. $109^{\circ} 47\frac{1}{2}' E.$

PULO MANKAP or MANCO,* in lat. $3^{\circ} 5' S.$, long. $110^{\circ} 13' E.$;† and distant about 8 miles south-west of Sambar point, is a small low island, which may be seen 15 miles from the deck of a large ship. Near to it, to the N.N.E., are three other small isles, which appeared to Captain Ross, when examining the surrounding shoal, as three bushy islets or rocks. It was noticed in the last page that there is shoal water to the southward of Mankap island, as far as the Clemencia reef; shoal water also extends far to the westward of it, and vessels must be cautious in approaching the island from both those directions. Captain Ross, in the *Discovery*, with the island bearing East, distant 10 miles, got suddenly into 4 and $3\frac{1}{2}$ fathoms, hard sand, on the shoal bank that encircles the island; when it bore N.E. about 7 miles, the soundings were $3\frac{1}{2}$ fathoms, fine sand; and when bearing N.N.E. $\frac{1}{4}$ E. 10 or 12 miles, seen from the deck, the vessel struck on the ground.

Horsburgh says, Mankap island ought not to be brought to the northward of N.E. by N. while in sight from the mast-head, for if it bear N.N.E. $\frac{1}{4}$ E., about 18 miles distant, a vessel will suddenly get into shoal water on some of the spits that stretch far to the southward, having from 10 to 17 fathoms, soft bottom, near them.

LAAG ISLAND is the largest of a group of islands lying N.W. 9 or 10 miles from Sambar point. The whole are encompassed with reefs, and the shoal bank which extends 10 or 11 miles westward of Mankap island, also extends 5 or 6 miles westward of the Laag group.

KUMPAL † or RENDEZVOUS ISLAND.—The west point of this island by Captain Ross is in lat. $2^{\circ} 44\frac{1}{2}' S.$, long. $110^{\circ} 2\frac{1}{2}' E.$, but Sir Edward Belcher, who visited it in H.M.S. *Sulphur*, October 1840, places a ledge of rocks on the west point in long. $110^{\circ} 7' 39'' E.$, or $6^{\circ} 16' 21''$ east of Singapore, and $9^{\circ} 16' 24''$ west of Macassar.

The *Sulphur* took up a safe berth within one mile of the west point of the island; and her tender the *Starling* occupied a position within one-eighth of a mile from the shore, but had rocky bottom. A plan was made of the anchorage, and the results of the examination proved it to be much safer and more convenient than the chart or sailing directions led to expect, admirably adapted to replenish fuel or correct chronometers, and with this object in view some pains were taken to connect it with the meridian of Singapore. The rocky portion of the island is composed of a mixture of contorted slaty and sandstone schist, traversed by veins of quartz, exhibiting slaggy indications at the point of contact,

* Manco signifies a bason, bowl, or cup in the Malay language.

† The late Lieutenant Raper, R.N., adopts $110^{\circ} 7' E.$

‡ Pulo Kumpal, in Malay, designates an island to which vessels resort.

apparently ferruginous, but on examination did not affect a very delicate needle. Wood is abundant, but the search for water was unsuccessful.

This island was, in former times, the rendezvous for the China convoys in case of separation. The following is from Horsburgh :—The island extends about 12 miles to the north-eastward, and a chain of small islands and reefs nearly joins it to the main ; this chain stretches also southward along the coast to Pulo Mankap, and is fronted with shoal water. About 6 miles S. by W. from the west point of the island is a bank with 3 or $3\frac{1}{2}$ fathoms, which makes it proper in leaving the anchorage at the north-west part of the island to haul off to the south-westward, to give a berth to this bank. In July land and sea breezes prevailed, the former at East and E.S.E., veering to S.S.E. in a breeze. The island shows in hummocks, but cannot be seen above 16 or 17 miles, and the west point forms in a bluff, when viewed from the south-west or southward.

The *William Pitt*, in July, anchored in $4\frac{1}{2}$ fathoms, about 4 miles off shore, with the west point of Pulo Kumpal S. $\frac{1}{2}$ W., its north point E. by N. $\frac{1}{2}$ N., a small isle off the latter point E. by N. $\frac{3}{4}$ N., another isle E.N.E., a third small isle with trees on it North, just visible from the poop, and the north extreme of Borneo N.N.E. The first two isles are united by a coral reef which extends 2 miles N.N.W. from the second island, having near its extremity a large rock 20 feet above water; from this rock in a north-east direction there is another island about 4 miles long, surrounded by coral reefs.

Although coral reefs, with sharp pointed rocks visible at low water, project from 1 to 3 miles from most parts of Pulo Kumpal, yet the western side appeared tolerably clear, with a sandy beach. From the west point of the island the land forms an elbow, by which there is shelter from all winds from the eastward, with smooth water.

Water.—Sir Edward Belcher did not find any water on the island, but Horsburgh states that the crew of the *William Pitt* dug wells above high water mark on the sandy beach on the west side of the island, from which very good water was obtained.

TIDES.—The tides were found to be more regular here than at any other part of the west coast of Borneo ; the rise and fall was 8 or 9 feet.

ROCKS AWASH.—In a Dutch chart by J. G. Tindal, 1842, some rocks awash are placed in lat. $2^{\circ} 20\frac{1}{2}'$ S., about S.W. by W. 12 miles from Mount Minto.

GILBERT ROCKS, and ELLIOT SAND.—In lat. $2^{\circ} 14'$ to $2^{\circ} 16'$ S., and 4 or 5 miles off Mount Minto point, lie the Gilbert rocks (Minto rocks of Horsburgh) with Mount Minto bearing about E. $\frac{3}{4}$ N., and High peak about E. by S. $\frac{1}{2}$ S.

A mile or two south-east of Gilbert rocks, is a dry bank named Elliot sand.

SOUNDINGS.—About 16 or 18 miles off this part of the coast the depths are mostly from 14 to 17 fathoms. In hauling in for Pulo Kumpal they will decrease to 7, 6, or 5 fathoms near the reef that fringes its western point, and projects around it to the southward and eastward. About 4 miles outside the Gilbert rocks, the depths are 9 or 10 fathoms.

ISLANDS, CHANNELS AND DANGERS, BETWEEN CARIMATA ISLAND AND THE COAST OF BORNEO.

BIRDS NEST ISLANDS, are a group of small islands 3 or 4 miles in extent, and surrounded by a reef. The northernmost island, named Boorong, is in lat. $1^{\circ} 43' S.$, long. $109^{\circ} 15\frac{1}{2}' E.$

BLACK ROCK is 4 or 5 miles to the south-west of the Birds Nest group. There is a rock under water about half a mile eastward of it, a rock awash nearly a mile to the southward, and another awash the same distance to the south-westward.

SOUTH ISLAND, about a mile in extent, lies about $4\frac{1}{2}$ miles N.E. from the Birds Nest islands. A smaller island lies close to its north-west side, and a rock off its south-east side.

GINTING, MINTANO, GRISSE, and BISI, are four small islands, the most eastern of which, Ginting, is in lat. $1^{\circ} 41' S.$, long. $109^{\circ} 4\frac{1}{2}' E.$

Bisi is about $3\frac{1}{2}$ miles from Carimata, to which it appears to be almost connected by a projecting reef.

BOLD and TONGUE ISLANDS, form a group of four small islands. Bold, the most southern and western island of the group, bears North 3 miles from Ginting.

The eastern Tongue island is very small. The north Tongue island has a reef projecting from it nearly 2 miles in a N.N.W. direction. The middle Tongue is about twice the size of the other two islands.

A **REEF**, about a mile in extent, lies 2 miles north-westward of Bold island.

PYRAMID NIBONG and HELINET ISLANDS.—Pyramid or Boan island is about $1\frac{1}{2}$ miles in extent, and its centre is in about lat. $1^{\circ} 29\frac{1}{2}' S.$, long. $108^{\circ} 59' E.$ Nibong and Helinet are much smaller islands, lying about a mile northward of Pyramid.

The **OSTERLY CHANNEL**, through which the ship of that name passed, lies westward of the Birds Nest islands, Black rock, Bold island, and the

reef north-westward of it, Pyramid Nibong and Helinet islands ; and eastward of Ginting, the islands and reefs north-east of Bisi, and the east coast of Carimata. The narrowest part is between Bold island and the reefs extending eastward of Bisi, where it is but $1\frac{1}{2}$ miles broad, with depths of 5 or 6 fathoms ; westward of Black rock the depths are 10 to 12 fathoms ; and from 10 to 13 fathoms between Carimata and Pyramid island. The *Osterly* found this route very intricate, and several times had rocky bottom and very shoal water.

PAPAN ISLANDS form two small groups, between which is the Papan channel, about a mile wide, with 9 to 12 fathoms water. Maleidong, in lat. $1^{\circ} 31' S.$, long. $109^{\circ} 22' E.$, is the largest of the islands, and with two islets near its north side form the eastern group. The western group is said to consist of four* islands, nearly of the same size, the southernmost bearing about South from the one next it ; the remaining three are in line when bearing about N.E. by E. and S.W. by W.

SPIRIT of the NORTH SHOAL. — The ship *Spirit of the North*, Charles Wise, commander, from Macao to London, September 21st, 1861, was reported to have struck on a shoal lying 2 to $2\frac{1}{2}$ miles N.W. of the middle island of the western Papan group ; the shoalest water obtained was 12 feet. There was no ripple on it, but small round white patches were indistinctly seen under the vessel's bottom.

PASSAGE ISLANDS are two small islands lying close together, 10 miles N.W. by W. $\frac{1}{2}$ W. from the western group of the Papan islands.

A **ROCK**, is marked on the chart, in lat. $1^{\circ} 30' S.$, long. $109^{\circ} 5\frac{1}{2}' E.$, but its position is doubtful.

MELAPIES ISLANDS comprise a group about 5 miles in extent, lying to the south-west of the high island of Panambungan. Three islands of the group are tolerably large and high, with several contiguous islets, the north-eastern of which, Double island, lies about $2\frac{1}{2}$ miles from the south-west extreme of Panambungan.

RODGERS REEF. — In 1857 Mr. Rodgers, master of an English ship, discovered a shoal with probably less than 4 fathoms water on it, the east point of Carimata island bearing S. $\frac{1}{2}$ W., and the Leema islands W. by N. $\frac{1}{2}$ N.

BUTTON ISLAND lies about 9 miles eastward of the Melapies group, and about $6\frac{1}{2}$ miles E. by S. $\frac{1}{2}$ S. from the south-west point of Panambungan.

* There are only three islands marked on the Dutch chart, and also a rock in the channel between the groups.

PULO PANAMBUNGAN is high, 5 miles in extent N.E. and S.W., and its western point is in lat. $1^{\circ} 12' S.$, long. $109^{\circ} 10' E.$ There are four small islets off its eastern extreme, the outermost of which is 4 miles N. by W. $\frac{1}{2}$ W. from Button island; there is also a small islet, named Sirie, lying off its south-western extreme.

Anchorage and Water.—There is good anchorage off the north-western side of Panambungan, in $5\frac{1}{2}$ or 6 fathoms, with shelter from southerly winds. Fresh-water bay, at this part of the island, has two runs of good water, the westernmost of which is the largest, where the water is obtained behind a large black rock on the beach; the boats may approach close, or the casks can be landed on the beach, which consists of fine sand. The *William Pitt* anchored in $5\frac{1}{2}$ fathoms, soft mud, with the island S. $\frac{1}{2}$ E. to N.E., off shore $1\frac{1}{4}$ miles, and off the watering place 2 miles; the first and best watering-place bearing E. by S. $\frac{1}{4}$ S.; second watering-place S.E. by E.; third watering-place S.E., and Masien Tiega islands N. $\frac{1}{2}$ E. All these watering places are fronted by fine sandy beaches, and easily discerned. There are spars fit for topmasts on the island, but the trees seem to be too heavy.

BAROE and ANANAS ISLANDS are the largest and outermost of a group of small islands lying off the north-western extreme of Mayang islands.

MASIEN TIEGA are three small islands, the outer or westernmost of which is in lat. $0^{\circ} 55' S.$, long. $109^{\circ} 12' E.$ The chart shows a reef extending from them to the south-west.

GREIG CHANNEL is the passage between Panambungan and the Melapies islands, and the route by it and among the islands to the south-eastward, although narrow in some parts, has moderate depths with generally good anchorage, and seems preferable to the route westward of Carimata and Soruetou, for ships that have to work along the coast against the monsoon, whether bound northward or southward.

DIRECTIONS.—Being to the northward of the dangers off Minto point (page 167), the Borneo coast may be approached to 9 or 8 fathoms water, and to 7 or 6 fathoms when nearing the Papan islands. The Birds Nest islands should not be approached under 10 fathoms, or nearer than 2 miles. A vessel may pass on either side of the two groups of the Papan islands, observing that the water quickly shoals to 5 fathoms eastward, or inshore of them. If passing westward of them remember the Spirit of the North shoal (page 168). Between South island and the Papan islands the depths are 10 to 12 fathoms, decreasing pretty regularly towards the Borneo coast; and between the Papan and Passage islands there are 7 to 12 fathoms. Northward of the Papan islands the soundings appear to

shoal rather suddenly from 8 to 5 fathoms, but gradually under that depth. The Greig channel appears to be bold towards either shore with depths from 14 to 20 fathoms in the fairway.

When northward of Panambungan, the Borneo coast may be approached to 9 or 8 fathoms at discretion, but under 8 fathoms the soundings seem to decrease rather quickly. A vessel may stand off to 15 fathoms near the Leema islands, and to 17 or 20 fathoms when to the northward of them, but remember the Welleley Crescent, and Greig shoals.

THE INNER CHANNEL, between the east end of Panambungan and the south-west extreme of Mayang island, may be used by small vessels, as it has regular soundings of 3 or 5 fathoms, soft bottom.

SOUNDINGS.—The soundings near the different dangers lying in the main channel of Carimata strait, have already been given; it will, therefore, be only necessary here to refer to the soundings in the fairway of the channel.

In lat. $3^{\circ} 32' S.$, or 7 or 8 miles southward of Doubtful rock (page 164), is a bank of 9 and 10 fathoms, which does not appear to have been properly sounded over, and it is possible that less water may be found upon it. In the fairway of the main channel, between this Doubtful rock and Discovery East bank, the soundings vary from 19 to 28 fathoms. Eastward of the Montaran islands are 14 to 17 fathoms in the middle of the channel, increasing to 23 or 25 fathoms towards Catherine reef. Between the Montaran islands and Ontario reef there are 20 to 23 fathoms; and from 17 or 18 to 22 and 25 fathoms between Ontario reef and Soruetou; from thence towards Greig shoal are 21 to 25 fathoms.

DIRECTIONS through CARIMATA STRAIT from the SOUTHWARD.—Approaching Carimata strait from the southward, a vessel will have to depend principally upon the correctness of her reckoning, for the soundings are so irregular that they will afford but very imperfect guidance, and the land is too distant to be of service in determining her position. If to the westward of about long. 108° to $108^{\circ} 20'$, a good lookout should be kept to get sight of Shoe island (page 154), which, if seen, will determine her position, and enable her to steer to pass into the strait, either by the main route eastward of the Discovery, Lavender, and Cirencester shoals, or by the route westward of those dangers, between them and the Osterly shoals.

Should the vessel be to the eastward of $109^{\circ} 30'$, and approaching the parallel of $4^{\circ} S.$, the greatest care must be observed to keep to the westward of the dangers which extend about 42 miles S. by W. from Mankap island; and the navigator must be guided by circumstances as to whether he shall proceed eastward or westward of Doubtful rock and Oliviera reef.

It is often advantageous, on account of the tide, to pass inside those dangers, but it is much better, if possible, to keep the main channel. Having passed Pulo Kumpal (or Rendezvous island), a course may be shaped to pass on either side of the Ontario reef. Carimata, Soruetou, and the adjacent islands will afford good objects for determining the vessel's position if she pass northward of the reef, and the Montaran islands will answer a similar purpose if she pass southward.

DIRECTIONS through CARIMATA STRAIT from the NORTH-WARD.—Coming from the north-westward towards Carimata strait, if intending to pass outside or southward of Ontario reef, having brought Soruetou to bear N.E., distant 25 miles, steer S.E. by E., to give a berth to the Supposed rock westward of the Ontario reef. To keep to the westward of this Supposed rock, it would appear to be necessary to sink the west end of Soruetou from the deck of a large ship before it bears north of N.E. by N. Keep the west end of Soruetou to the eastward of N. by E., until past Ontario reef, or 25 miles to the southward of Soruetou, or sink the west end of the island from the deck of a large ship bearing about N. by E.; continuing the S.E. by E. course the Montaran islands will be seen, if the weather is favourable; pass to the eastward of them at 15 or 16 miles distance. From this position a S.S.E. course will lead in the fair track, between the Cirencester and Discovery shoals on the west side of the channel, and the Oliviera reef and Doubtful rock on the east side. If not certain of the longitude, the best guide is to borrow towards the coast of Borneo, to get a sight of the land if circumstances admit, and taking a departure from Rendezvous island, steer to the southward between Oliviera reef and the Mankap shoals.

The best track for ships bound to the southward, particularly in cloudy weather, is to pass northward of Ontario reef, by keeping within 10 or 12 miles of Soruetou, until its west extreme bears N. $\frac{1}{2}$ W.; then observing to keep it to the west of N. $\frac{1}{2}$ W., in steering to the S.S.E., until the reef is passed. Proceeding to the southward, borrow towards the eastern side of the strait, where the soundings will generally be from 17 to 14 fathoms within from 30 to 20 miles of the coast of Borneo, deepening in some places as the shoals are approached on the west side of the strait, but not always affording a certain guide. To the southward of Rendezvous island, the depths will increase from 19 to 21 fathoms irregular soundings, when about 30 or 33 miles to the south-westward of Pulo Mankap, which is as near as any large ship should approach the shoals that extend far out from it in this direction.

CHAPTER VI.

OUTER ROUTE FROM BANKA STRAIT TO SINGAPORE.

VARIATION $1^{\circ} 20'$ EAST, in 1866.

VESSELS bound from Banka strait to Singapore seldom adopt the Outer route to the eastward of the islands of L \acute{u} nga and Bintang, most vessels preferring to proceed by Rhio strait ; it however forms part of the main route into the China sea, and is, therefore, of great importance.*

THE COAST of SUMATRA from Batakarang point (page 63) trends about N.N.W. towards Jaboeng point, sometimes known as Cape Bon, in about lat. $0^{\circ} 59'$ S. The entire coast, which is very low, covered with wood, and entirely unknown, is fronted by a mud-bank, that may be approached to 6 or 5 fathoms water, except off Jaboeng point, close to which there are in some places 9 fathoms, but all vessels should keep 3 miles from it. A bank of 4 fathoms was found by H.M.S. surveying vessel *Saracen* in 1861, with Jaboeng point bearing N.W. by W., distant 9 miles; a depth of 6 fathoms also nearer the shore. This is probably a projecting horn or spit extending from the mud flat, and as shoaler soundings may be found, vessels bound to Varella strait should keep 5 miles off shore until Jaboeng point bears West.

TONJON, or SEVEN ISLANDS, lie in two groups, between the parallels $1^{\circ} 17'$ and $1^{\circ} 6\frac{1}{2}'$ S., and the meridians $105^{\circ} 15\frac{3}{4}'$ and $105^{\circ} 22'$ E. They are high and woody, visible at 25 or 26 miles, and surrounded by rocks and reefs. They are uninhabited, but occasionally visited by proas, for the purpose of obtaining wood and water ; the water, which is bad and scarce, is procured on the west side of Katjangang island, where there are a few wells.

Pulo Joe, the southernmost of the islands, is very small, but rises to a height of 270 feet ; a short distance north-east of it is a sunken rock. Pulo Lalang is an islet about a mile N. by E. from Pulo Joe ; and a mile W.S.W. from it is another islet surrounded by a reef. Pulo Sato, the most western of the islands, is small, 105 feet high, and bears from Pulo

* See Charts:—Banka strait to Singapore, No. 2,757 ; scale $m = 0.15$ of an inch : and L \acute{u} nga and Sinkep channels, No. 1,789 ; scale $m = 0.10$ of an inch.

Joe about N.W. by N., distant 5 miles. Pulo Meranti, also a small island surrounded by a reef, is 117 feet high, and lies between Lalang and Sato. Pulo Tjebia, the largest island of the southern group, is about a mile in extent, 373 feet high, and surrounded by a reef which projects a little more than a mile from its south-east extreme.

Pulo Katjangang, the north-easternmost and largest of the Seven islands, is 4 miles long N.W. $\frac{1}{2}$ W. and S.E. $\frac{1}{2}$ E., but only half a mile broad, and rises to several peaks, the highest of which is 526 feet above the level of the sea. It is surrounded by a reef, within the limits of which are some rocks above water, especially off its south-east end. About $2\frac{1}{2}$ miles N.W. by W. $\frac{1}{2}$ W. from its north-west extreme, is Pulo Toekonkembong, a small islet, 120 feet high, and surrounded by a reef. About $1\frac{1}{2}$ miles W.N.W. from Toekonkembong, are the N.W. Rocks, the middle one of which is above water.

DOCAN ISLAND, in lat. $0^{\circ} 59\frac{1}{2}'$ S., long. $105^{\circ} 41'$ E., is about three-quarters of a mile in extent, surrounded by a reef, and a small islet with some rocks project nearly a mile from its north-eastern extreme.

Two reefs lie off the south point of Docan, the outer one of which, lying S.S.E. distant 2 miles from the point, was discovered in January 1823, by the ship *Mary* striking on it. There are 2 fathoms water over each of these dangers, and around them 14 to 18 fathoms.

The channel between the Toejoë islands and Pulo Docan is 21 miles wide, and has regular soundings of 14 to 16 fathoms.

TOTY ISLAND, or PULO LAUT, in lat. $0^{\circ} 55'$ S. long. $105^{\circ} 47\frac{3}{4}'$ E., is small, and surrounded by a reef, which on the east side projects half a mile.

The passage between Toty and Docan is 6 miles wide, appears to be free from danger, and the depths in it are from 16 to 20 fathoms.

DIRECTIONS.—When passing between Banka and the Toejoë islands, the latter should not be approached to less than 10 fathoms water, nor Banka nearer than 4 miles, for its dangers are all 2 or 3 miles in the offing, and nearly awash. Near the Hyū and Doyang rocks the bottom is rocky, and the depths irregular.

Vessels keeping to the southward of Toty and Docan islands, in order to cross over to Borneo, must take care to avoid the Mary rock, lying S.S.E. 2 miles from Docan island, and also the Vega and other shoals, described at page 148.

Between the north coast of Banka and the Toejoë, Docan, and Toty islands, the general depths are from 14 to 17 fathoms, but more to the eastward they increase to 20 fathoms.

From October to March, during the N.W. monsoon, the currents run

with force to the S.E., and during the other months to the N.W. It has, however, occurred that vessels going to Banka in June and July have experienced strong southerly currents. Along the north shore of Banka, in regular weather, there are generally two ebbs and two floods in the 24 hours.

SMITH BANK.*—In old charts a shallow spot of $2\frac{1}{4}$ -fathoms, hard bottom, was shown at 22 or 23 miles southward from Taya island, and W. $\frac{1}{2}$ N. from Toejoë island, said to have been discovered by the English vessel *Thomas Harrison*, Captain E. Smith. The *Saracen* anchored on its supposed position, S. $\frac{3}{4}$ E. 20 miles from Pulo Taya, and sounded in every direction, 10 miles northward, 4 miles southward, and 5 miles eastward and westward. The soundings were regular, from 7 to 9 fathoms, mud bottom, and gave no indications of the existence of a bank.

PULO TAYA, the centre of which is in lat. $0^{\circ} 45' S.$, long. $104^{\circ} 56' E.$, rises to a double peak 630 feet above the sea; the northern peak is about 60 feet less in elevation than the southern one, and both peaks when in line on a N. by E. and S. by W. bearing, show as a single triangular peak. Two sandy bays are formed in the bight between the hills, and there are two small islets off its north-east side. The whole shore of the island is steep, and may be approached to a distance of 3 cables. The island is uninhabited, of granite formation, and covered with wood.

Water.—There is a spring of excellent water on the western side of Taya, and a boat at high tide can approach it to 40 feet, but at low tide rocks extend nearly a cable's length from the sand. The knowledge of this is important to the mariner, as no similar facility for watering occurs between Banka and Rhio strait. In the fine season boats come here from Linga seeking turtle.

CASTOR BANK, lying to the north-eastward of Pulo Taya, is a long ridge of coral and sand, nearly a mile wide, and 13 miles long in a N.N.E. direction. The general depths on it are 10 to 6 fathoms, but on one part, N.E. $\frac{1}{2}$ N. 10 miles from Pulo Taya, there is a ridge about a mile in extent, and its eastern side steep-to, carrying only 5 fathoms. The bank is famous for a red species of fish, called from their colour *Ikan Merah*.

Pulo Taya bearing S.W. $\frac{1}{2}$ W., will lead more than a mile eastward of the shoal parts of the Castor bank, and bearing S.W. by S. the same distance to the westward. Tanjong Eung, the east point of Linga, which, with a point to the westward of it, appears at a distance like two islands, bearing

* The information relating to Smith bank, Pulo Taya, Castor bank, and Linga island, together with Frederick reef and the whole of the islands and dangers off the east coast of Bintang has been derived principally from the result of the surveys by Mr. Stanton, Master commanding H.M. surveying vessel *Saracen*, in 1860-61.

N.N.W., will lead about 4 miles north-eastward of the Castor and also of the Ilchester bank.

COWMAN BANK, said to lie $6\frac{1}{2}$ miles N.E. by N. of the Castor, was searched for by the *Saracen* in vain. The Dutch have also made several ineffectual attempts to find it, and the bank is erased from their charts. Neither do the fishermen of Linga believe in its existence.

ILCHESTER, or ALANG KALEM BANK, on which the ship *Ilchester* struck, was examined by Captain D. Ross, I.N., who found it to be in lat. $0^{\circ} 26\frac{1}{2}'$ S., long. 105° E., to extend N. by E. and S. by W. about $2\frac{1}{2}$ miles, and $1\frac{1}{2}$ miles in breadth, and to have but one fathom water on its shoalest parts. Pulo Taya bore from the shoal S. $\frac{1}{2}$ W., Maralie islet, off the east point of Linga, N. by E., the east point of Linga N. $\frac{1}{2}$ E., distant 8 or 9 miles. The depth of water decreases nearly all around from 18, 16, or 15 fathoms, suddenly to 5 and 3 fathoms on the edge of the shoal.

When passing this danger, Maralie islet must not be brought to the eastward of North, and Pulo Taya should be kept to the westward of S. by W.

PULO SINKEP, PULO FUNOBBO, and two islands to the westward, appear from a distance like one large island, being separated only by narrow channels. They lie off the south-western part of Linga, and, together with some adjoining islets and shoal spots, cover a space from 20 to 24 miles. Sinkep, the largest island of the group, is of very irregular shape, and of considerable elevation, having on its eastern side a range of hills with a peak 1,440 feet high near the centre of the range. It is only the east and north-east coasts of Sinkep and the dangers off it which will be noticed here; the other portions of the group belong to the Inner route, by Varella and Durian straits, and are described at page 213.

Dangers.—At $3\frac{3}{4}$ miles E. by S. $\frac{1}{4}$ S. from the south-east point of Sinkep, is the south end of a shoal, which from thence extends N.N.E. for 5 miles, but is only about $1\frac{1}{2}$ miles broad. At the south end of the shoal is a patch of $2\frac{1}{4}$ fathoms, and another of $2\frac{3}{4}$ fathoms at the north end; between these patches are depths of $4\frac{1}{2}$ and 5 fathoms. Tanjong Boekoe (the south point of Sinkep) bearing West leads a mile southward of this danger; and the eastern point of the island bearing North leads about the same distance eastward.

Rocks and shoal water extend nearly a mile from the east point of Sinkep, and the *Saracen's* soundings show a bank projecting 5 miles in a north-easterly direction from it, on the extremity of which there are but 4 fathoms water. As no soundings have been taken near the north-east coast of Sinkep, it should be approached with caution. There are some

rocks awash off the east sides of the small islets lying between the north-east point of Sinkep and Ponoebo.

LINGA ISLAND, lying about midway between Banka and Singapore straits, is about 35 or 36 miles in extent, in a W.N.W. and E.S.E. direction, but, excepting at the southern part where the town and road are situated, the island is very little known and has never been surveyed. Upon its southern part is a remarkable mountain, the peak of which, rising to an elevation of 3,920 feet, is split in two, forming a sort of double peak, which Horsburgh describes as "two peaks rising like spires from the summit of the mountain," but which is more generally thought to resemble asses' ears, visible many miles in all directions. Viewed from the sea this mountain presents a most beautiful and imposing appearance, which is sure to arrest the attention even of the most careless observer.

The north-eastern coast of the island is formed of numerous hillocks, from 200 to 300 feet high, which give it a uniform appearance; the contour of the coast line is, however, very imperfectly known.

The east extreme of Linga, called by the natives Tanjong Eung, from its prominent position and pyramidal peak, 750 feet high, is very conspicuous, and visible in clear weather 30 miles off. Tanjong Roe may be known by a saddle hill, 630 feet high, near it. The southern coast of Linga, between these points and between Tanjong Roe and the town of Linga, being all low land, both points make like islands when above 13 miles distant.

Pulo Maralie is an islet lying three-quarters of a mile off shore, in a S.E. by E. direction from the hill on Tanjong Eung. Pulo Kaka, a larger islet lying about half a mile off shore in a South direction from the same hill, is surrounded by a reef which off its south-west point extends a mile. Between Tanjong Eung and Tanjong Roe the coast falls back, and forms a deep bight named Tolo bay, on the east side of entrance to which is a small islet with some rocks awash around about it. Pulo Singasa, a small islet, lying a little more than a mile to the southward of Tanjong Roe, is surrounded by a reef, and a rock awash lies half a mile off its south end; soundings of 4 and 5 fathoms extend about a mile southward and south-westward of it.

LINGA ROAD and TOWN.—The bay forming Linga road is exposed to southerly and easterly winds, and large ships are obliged to lie far out on account of shoal water extending from the mouth of the river around Pulo Colombo and its adjoining islets. Pulo Colombo, the largest of these islets, lies S. by E. $\frac{1}{4}$ E. nearly 2 miles from the entrance of the river. Anto and Ballang islets are both small, the former lying about a mile S.E., and the latter the same distance E. by S.

from Colombo. W. by S. $2\frac{1}{4}$ miles from Colombo is another small islet named Badas, which is almost connected by reefs to Pulo Mapar, a larger islet about a mile to the northward, with a grove of cocoa-nut trees on it; the village here contains about 300 Malays and Chinese, chiefly fishermen.

The following are the outermost of the dangers extending from the islets:—A shoal with only 2 feet water over it lies with Pulo Badas and Pulo Mapar in one N. by W. $\frac{1}{4}$ W., and the south point of Pulo Colombo N.E. by E. $\frac{1}{4}$ E. Another shoal extends 2 miles S.S.E. from Pulo Anto, having $1\frac{1}{2}$ fathoms water on its extreme; Ponoebo peak, bearing W. $\frac{1}{4}$ N., leads over the tail of this shoal, and bearing W. $\frac{1}{2}$ N. leads half a mile southward of it and nearly a mile southward of the 2-feet shoal off Pulo Badas.

H.M.S. *Saracen* anchored in Linga road in 4 fathoms, mud, Pulo Badas bearing N.N.E. half a mile, Sinkep peak, 1,440 feet high, S.S.W., and Ponoebo peak, 955 feet high, W. $\frac{1}{2}$ S. Horsburgh says that the safest anchorage for strangers is 3 or 4 miles off shore, with Pulo Taya S.S.E. $\frac{1}{2}$ E., and the south point of Linga East-southerly. Linga peak just to the eastward of Colombo, N.W. $\frac{1}{2}$ W. or N.W. $\frac{3}{4}$ W., with Ponoebo peak bearing about W. $\frac{1}{4}$ S., and the peak of Sinkep S.W. by W., appear also to be good anchoring marks.

The town of Linga, called by the natives Dyak, is prettily situated on the banks, and nearly a mile within the entrance of the fresh water river marked on the chart. The high, rugged, fantastic peak of Linga in the background, together with the rakish appearance of the country prahus, all moored to cocoa-nut trees and areca palms, their rich foliage almost obscuring the houses, give to the whole a picturesque appearance. The river is not more than 100 feet wide, and will only admit small vessels, as its bar dries at low water springs. Both sides near the entrance are densely wooded, and alligators are numerous.

The town is said to contain (in 1860) about 4,000 Malays and 1,500 Chinese. The former prefer their usual style of houses constructed on poles, but some of the Chinese have substantial buildings of stone. The produce is rattans, pepper, and gambier, which is carried to Singapore and Rhio by country vessels and prahus. Gold is found in small quantities after heavy rains. Tin has not yet been found, but the neighbouring island of Sinkep produces some. There are no Europeans on the island. The Sultan is nominally under Dutch protection, and the resident of Rhio pays him an annual visit.

Water.—The *Saracen* obtained good water, but with difficulty, from a well in the interior of Mapar island. It was at first procured from a well near the village, but the natives, from religious scruples, objected to its use. The shore is bordered by a reef, which makes watering difficult, except from half flood to half ebb.

TIDES.—In Linga road it is high water, full and change, at 7 p.m., and the rise is 7 feet. The flood runs at the rate of 2 knots to the westward.

DIRECTIONS.—A vessel proceeding towards Linga road from Banka strait, should pass westward of Pulo Taya, and steer for the high land to the eastward of Linga peak, giving the eastern coast of Sinkep a berth of at least 5 or 6 miles. In working, by not bringing the east point of Sinkep to the eastward of North, will avoid the shoal off the east side of that island; and by not bringing the south-east point of the island to the southward of S.W. until Linga peak bears N.N.W. $\frac{1}{2}$ W., will avoid the shoal bank which extends 5 miles in a north-easterly direction from the east point of Sinkep. When standing towards the south coast of Linga care must be taken to avoid the De Hes rock, with 16 feet water over it, which lies with the south extreme of Pulo Singa bearing E. $\frac{3}{4}$ N., distant 4 miles; Linga peak N.W. by W. $\frac{1}{2}$ W.; Sinkep peak W. by S. $\frac{1}{2}$ S.; and the nearest points of Linga bearing respectively N.E. by N.—northerly distant 2 miles, and N.N.W.—westerly distant $2\frac{1}{4}$ miles; close to the rock are 12 or 14 fathoms. The right extreme of Pulo Kaka just open of the right extreme of Pulo Singa, bearing about E.N.E., leads a mile to the south-east of the De Hes rock, and Linga peak N.W. by W. leads to the south-west.

Bound to Linga road from the north-eastward, round the east point of Linga island at a moderate distance, and then steer to the westward for the anchorage.

THE NORTH-EAST COAST OF LINGA is formed of numerous hillocks, from 200 to 300 feet high, which give it a uniform appearance; but neither it nor the adjacent islets are safe to approach at night, being as yet but imperfectly surveyed. The soundings obtained by the *Saracen* in this locality, were confined to those above a depth of 10 fathoms, as vessels can gain no advantage by keeping close in shore.

EAST DOMINO, or Selentang, is an islet lying about 8 miles northward of Tanjong Eung, the east point of Linga. Horsburgh says that this islet is 80 feet high, and that rocks awash project from it to the southward, to the distance of $2\frac{1}{2}$ miles; but the Dutch chart only shows a reef extending about a mile north and south of the islet, and a smaller islet close to the westward of it; a rock awash is placed about $2\frac{1}{2}$ miles south of it. The soundings close to the eastward of the islet are 14 fathoms, increasing to 16 and 17 fathoms at the distance of 3 or 4 miles.

DOMINO HILL, or Boediang island, is about 2 miles in extent, and a peaked hill near its centre bears W. by S. $\frac{1}{4}$ S. 4 miles from the East Domino.

GREAT DOMINO, or Kongka island, is larger than Domino hill, from which it bears N.W. $\frac{1}{2}$ N. $3\frac{1}{2}$ miles. It is said to be moderately elevated, and the chart shows a peaked hill on its western side. Off its south-east point are two islets named Maras, and off its north-west point are two others, named Saroes or Blaiding.

CROCODILE ROCK, about 15 feet above water, and visible 5 miles off, lies N.E. $\frac{3}{4}$ N. 4 miles off a conspicuous conical hill on the north-east part of Great Domino, and its position is about lat $0^{\circ} 1' N.$, long. $104^{\circ} 54\frac{1}{2}' E.$ *

Domino Hill, if not brought to the eastward of South will lead well clear of this danger.

KINTAR ISLAND.—Three other islands with one or two contiguous islets extend from $4\frac{1}{2}$ to 8 miles in a north-westerly direction from the Great Domino. The large island next northward of Great Domino, named Kintar, has on its southern end a fine bluff, and when coming from the northward, before the contiguous islands to the southward are visible, it much resembles the hill on the east end of Linga.†

A rock lies N.W. by W. $\frac{1}{2}$ W., distant 2 miles from Pulo Kapas, which is a small islet surrounded by a reef, and the north-westernmost of the group extending from Kintar.

FLY BANK is a small patch of 2 fathoms, lying N.N.W. $\frac{3}{4}$ W. $10\frac{1}{2}$ miles from Crocodile rock, with the high bluff of Kintar bearing South, a little westerly, distant $7\frac{3}{4}$ miles, and Pulo Kapas W.S.W. $5\frac{1}{2}$ miles; close to it are depths of 9 to 13 fathoms.

POLLUX ROCK lies N.W. about 4 miles from Fly bank, with the high bluff of Kintar bearing S. by E. $\frac{1}{4}$ E. 11 miles, and Pulo Kapas S.S.W. $5\frac{1}{2}$ miles; close to it are depths of 10 and 11 fathoms.

RODONG PEAK.—North-westward of Linga island are many small islands. The most conspicuous of them is Pulo Rodong, or Merodong, which has a high conical peak, 724 feet above the sea, the only hill of this feature in the vicinity. This peak is one of the principal objects which will enable a stranger to make out the entrance to Rhio strait: it may, however, occasionally be useful to vessels working to or from Singapore by the Outer route.

SAND-BANK SOUTHWARD OF PULO GIN.—S.S.E. 16 miles from Pulo Gin, is the southern part of a bank carrying 7 and 9 fathoms water. It is 17 miles in length, N.N.E. and S.S.W., with its eastern side steep-to, and at its northern end Pulo Ruig bears N.N.W. $\frac{1}{4}$ W., which bearing clears also the Geldria and Frederick reefs. In the N.E. monsoon much rain and thick weather are experienced, and this bank is a good guide to clear these reefs, and will save anchoring in deep water.

* Stanton.

† Lieutenant C. J. Bullock, R.N.

FREDERICK REEF, in lat. $0^{\circ} 38' N.$, long. $105^{\circ} 10\frac{1}{2}' E.$, is awash at low water springs. It consists of two rocks about a cable's length apart, near the middle of a coral bank 3 cables in length north and south, and nearly 2 cables in breadth, having 20 to 22 fathoms all around, except at the north-east side, where irregular soundings from 10 to 13 fathoms extend half a mile from it. From the centre of the reef Pulo Ruig, or Ragged island, bears N.W. $\frac{3}{4}$ N. 22 miles, and Pulo Borean W.N.W. $21\frac{1}{2}$ miles.

In the vicinity of this reef in light winds the discolouration of the water is the only guide, and in fresh breezes it is difficult to distinguish breakers from the swell. Breakers on the reef can only be distinguished when the tide is setting against the wind with a comparatively smooth sea. Off Bintang island at the change of the monsoon in April, the flood tide runs for 18 hours, and the ebb 6 hours. In June the tides are reversed, consequently a tide against the wind will only take place a few hours each day.

As this most dangerous reef lies in the direct track of vessels, the utmost care is necessary to avoid it. A vessel will clear it to the eastward by not going into less than 25 fathoms, and to the westward by keeping Gin peak (a conspicuous hill, 337 feet high), Gunong Kwas (857 feet high on Bintang), and Pulo Borean well in sight, until the latter bears W. by N. The high peak of Linga island S.S.W. $\frac{1}{2}$ W. or Pulo Ruig bearing from N.N.W. to N.W. by N., will also lead clear.

From a close examination by Mr. Stanton in H.M.S. *Saracen*, soundings having been taken in every direction to the extent of 7 miles eastward, and from 4 miles southward of the reef to the Geldria bank, he was led to believe that the other reefs which were said to exist near are identical with it, and that the Frederick reef is the only danger in this vicinity.

EAST COAST of BINTANG.—Numerous islands and dangers lie off the southern part of the east coast of Bintang, among which no vessel should venture. Vessels making passages between Banka and Singapore straits should pass outside or to the eastward of the whole of these islands and dangers, and it is therefore only necessary here to notice the outermost of them. The whole coast and the islands off it are, as a rule, fringed with coral.

PULO GIN, or Great island, about 4 or 5 miles in extent, lies about 3 miles south-eastward of the south-east extreme of Bintang. Although appearing as but one island, it is really made up of three small islands separated from each other by narrow channels, which together form the largest island off this part of Bintang. There are several hills on it from 200 to 300 feet high, and one, named Gin peak, rising about the centre of the south-eastern portion of the island, is 337 feet high.

PULO TEROBI, the most southern of a cluster of small islets lying to the eastward of Pulo Gin, is 112 feet high, and bears E. by S. $2\frac{1}{2}$ miles from the south-east extreme of Gin.

PULO BOREAN, or Saddle island, is one of the outer islands lying 3 or 4 miles to the eastward of Pulo Gin, inside the Geldria banks, and bears from Pulo Terobi, N. by E. $\frac{3}{4}$ E. 5 miles. Being saddle-shaped, it is conspicuous and easily recognized.

PULO RUIG, or Ragged island, appropriately named from the irregular appearance of the trees on its summit, is the outer and easternmost island off the east coast of Bintang. It is about the same size and height, 315 feet, as Pulo Borean, and is steep-to at 3 cables' lengths off.

GELDRIA BANK is the outermost of a dangerous group of shoals lying 13 or 14 miles eastward of Pulo Gin, well out in the fairway of vessels proceeding between Banka and Singapore straits, especially such as pass inside Frederick reef. Its north extreme is in lat. $0^{\circ} 48\frac{1}{2}'$ N., long. $104^{\circ} 59\frac{3}{4}'$ E., from which it extends S.W. by S. about 2 miles, having 2 to 4 fathoms water over it, 19 to 20 fathoms nearly close to the eastern side, and 8 to 12 fathoms, irregular depths, near the south-west and west sides.

RALEIGH SHOAL lies W. by S. $\frac{1}{2}$ S. 3 miles from the south-eastern extreme of the Geldria. It has only 2 fathoms water over a coral bottom, from which Pulo Borean bears W. by N. $\frac{1}{2}$ N. 5 miles, and Pulo Ruig N. by E. 11 miles.

A SHOAL PATCH, with only 2 fathoms water over it, coral and sand, lies S.W. by W. $\frac{1}{2}$ W. nearly 6 miles from the south extreme of the Geldria. It is nearly a mile in length and half a mile in breadth, and from its centre Pulo Borean bears N.W. $\frac{1}{2}$ N., distant $4\frac{1}{2}$ miles.

There are several other knolls, with 4 and 5 fathoms over them, between this patch and the Geldria, of which they are considered to be a continuation; they should be avoided by vessels of heavy draught.

DIRECTIONS.—Pulo Terobi, the southern islet off Pulo Gin, bearing W. $\frac{1}{4}$ S., clears the southern extreme of the above shoals; and the Boat rocks in line with Pulo Borean W. by S. $\frac{3}{4}$ S., or Pulo Ruig N.N.W. $\frac{1}{4}$ W., clears the northern extreme. No good near marks can be given to clear the eastern side, which is steep-to, but the high peak of Linga bearing S.S.W. $\frac{1}{2}$ W., is a broad and distant clearing mark, and leads over the large sand bank, carrying 7 to 10 fathoms, south-eastward of Pulo Gin.

BOAT ROCKS, lying about $2\frac{1}{2}$ miles N.W. $\frac{1}{2}$ N. from the north end of the Geldria bank are three low rocks, visible about 4 miles from a ship's deck.

A rocky patch, with 3 fathoms water over it, lies between the northern extreme of the Geldria bank and the Boat rocks, the latter bearing N.W. by W., distant one mile.

A **CORAL BANK**, with 3 to 5 fathoms over it, and about one mile in extent, lies W.S.W., $5\frac{1}{2}$ miles from Pulo Ruig. Pulo Borean, or Saddle island, bearing S.S.W., clears its eastern side.

PULO PANJANG, which in the Malay language signifies Long island, lies about 9 miles off the east coast of Bintang. It is a large irregular-shaped island, the south side about 2 miles in extent, the north side about 4 miles, and its greatest length in a N.W. and S.E. direction is 5 miles. Rocks extend a mile off its north-east point; and there are others, some above and others below water, off its south-east point, the outer ones of which, named the Bare rocks, are 55 feet high.

On the north-east side of the island the coral reef,—which as a rule fringes all the islands contiguous to the east coast of Bintang, as well as that coast itself,—is absent, leaving a small sandy bay, where vessels may anchor in 8 or 9 fathoms, about three-quarters of a mile off shore. As the bottom in parts of this bay is foul, great care must be taken to keep the two Bare rocks open of a small islet with a single tree on it, forming the southern extreme of the bay.

Wood and Water may be procured in this bay, and boats can approach close to the beach at all hours of the tide.

PASSAGE ROCK, 55 feet high, lies about three-quarters of a mile to the northward of the north-east point of Panjang.

PULO SUTO, MIDDLE ROCK, BLACK ROCK, and PULO BLAN-KAP, lying north and north-west of Pulo Panjang, form a sort of chain stretching from outside the dangers off the north coast of that island to the shore of Bintang, and to the southward of which no vessel—except under extraordinary circumstances—should attempt to pass.

Pulo Suto, or Volcanic island, 140 feet high, lies N.W. by N. 2 miles from the north-east point of Pulo Panjang. It is steep to on the north side, but a reef extends half a mile from its south extreme.

Middle rock is a dangerous pinnacle, awash at low water, lying N. by W. $\frac{3}{4}$ W. $2\frac{1}{2}$ miles from the north point of Pulo Panjang, W. by N. $\frac{3}{4}$ N., nearly 4 miles from Pulo Suto, and S.E. by E. $\frac{3}{4}$ E. $2\frac{1}{2}$ miles from Black rock. Close to the rock are depths of 11 fathoms, with 14 to 16 fathoms a mile or two distant from it. It may be avoided by not bringing Black rock to the northward of W. by N., or by keeping without the direct line between Pulo Suto and Black rock.

Black rock, 22 feet above water, with a smaller rock close to its south side, lies N.W. by W. $\frac{3}{4}$ W. $2\frac{3}{4}$ miles from Middle rock, and nearly 5 miles

N.W. $\frac{1}{4}$ N. from the north-west point of Pulo Panjang. Near the rock the soundings appear to be irregular, 13 to 17 fathoms, and it may be approached to a distance of 2 cables.

Pulo Blanhap is a small island 90 feet high, lying E. by N. $\frac{3}{4}$ N. nearly 2 miles from Tanjong Blanhap, on the north-east coast of Bintang.

NORTH-EAST COAST of BINTANG.—From Tanjong Blanhap to Tanjong Brakit, 8 miles to the N.N.W. $\frac{1}{4}$ W., the north-east coast of Bintang forms a bay about 2 miles deep, indented with several small bights or coves. Over a point about a mile north-west of Tanjong Blanhap is a conspicuous tree, the top of which is 252 feet above the sea; 2 miles W.N.W. of the tree is a hill, 420 feet high. Three-quarters of a mile northward of this hill, close to the coast line on the deepest part of the large bay, is another, named Double Tree hill, 334 feet high.

The shore of this part of Bintang is for the most part fronted by a reef which projects in some places to the distance of half a mile, and just to the northward of the point, upon which stands the conspicuous tree, is an extensive bed of rocks, between which and the point north-westward of it is Boat cove. Boat cove appears to be a convenient place for a boat to land.

Water.—Two or three small streams of fresh water appear to discharge themselves near the middle of this bay, but the watering place is marked on the chart a short distance to the northward of Boat cove.

SOUNDINGS.—From Black rock, which is steep-to, to Pulo Coco, a small island lying close to the eastern face of Brakit point, and which may be approached to half a mile, the soundings shoal gradually, and the lead is a good guide (page 244).

TIDES.—It is high water, full and change, at Horsburgh lighthouse, Singapore strait, at 10 h. 10 m. p.m.; at Tanjong Brakit, the north-east point of Bintang, at 11 h. 0 m.; at Pulo Suto at 3 h. 40 m.; at Pulo Panjang at 4 h. 20 m.; at Pulo Borean at 6 h. 0 m.; and at Pulo Terobi at 1 h. 0 m. p.m.; the rise is 9 feet, but on extraordinary occasions it is 12 feet.

During the shifting months of the monsoons the tidal streams are regular, but during their strength the surface current will be always more or less governed by the wind.

The flood tidal wave comes from the northward, and runs nearly parallel to the east coast of Bintang, along its southern side towards Abang strait, and to the northward in Rhio strait, meeting another tide from Singapore strait near the town of Rhio.

The flood sets to the southward along the east coast of Linga, and close to Tanjong Eung, its south-eastern extreme; from thence it runs West to Poncebo strait and obliquely across Linga bay to Varella strait. From

Tanjong Eung to Pulo Taya, and onwards to Banka strait, its direction is nearly South ; another stream from about 2 miles south of Taya sets towards Varella strait.

The ebb stream sets in the opposite direction, and the meeting of this stream from Banka and Varella strait was observed to take place near the supposed position of Smith bank (page 174).

WINDS.—During the shifting months of the S.E. monsoon sailing vessels are often five and six weeks in making the passage from Singapore to Banka strait. In the month of September the *Saracen* had the S.E. monsoon strong, with much rain ; about the equinox there were several heavy squalls. This monsoon is generally supposed to shift about the beginning of October, but during the whole of this month the wind was only 4 hours from the northward, there being a succession of calms, light southerly airs, a close muggy atmosphere surcharged with electricity, and frequent heavy Sumatra squalls or south-westerners. On the 9th of November the monsoon shifted with furious gusts.

These squalls at this season generally take place at night, accompanied with heavy rain, thunder, and lightning. They are of short duration, and it was noticed that when one occurs about the time of full and change, another may be expected an hour later every night till the next change of moon.

DIRECTIONS by the OUTER ROUTE from BANKA STRAIT to SINGAPORE.—The ordinary route for vessels bound northward from Banka strait is between the Toejoe islands and Pulo Taya ; they may, however, pass on either side of Pulo Taya, which, being high and bold, is very convenient to make in thick weather or at night.

At night, or in thick weather, the lead will be very useful in detecting the drift caused by cross currents between the Toejoe islands and Sumatra, for the depth decreases generally towards Sumatra, and increases towards those islands ; but care should be taken in approaching them, as the remarkable irregularities of the currents have brought many vessels into the danger of being entangled among them. Near Sumatra a mud bottom mixed with sand prevails, and near the islands mud only.

The Castor bank, lying to the north-east of Pulo Taya, carries not less than 5 fathoms water, but a vessel will pass eastward of it by not bringing Pulo Taya south of S.W. $\frac{1}{2}$ W., and westward of it by keeping that island south of S.S.W. $\frac{1}{2}$ W. The east point of Linga (which, with a point to the westward of it, appears at a distance like two islands) bearing N.N.W. will lead from 4 to 5 miles to the north-east both of the Castor bank and the Ilchester shoal. But in order to avoid the last-named danger, if the channel between the Castor bank and Linga is used, take care not to bring the east point of Linga to the east of North.

Having passed eastward of Pulo Taya, a course may be steered to cross the equator in 20 or 21 fathoms, or in long. $105^{\circ} 30' E.$ From the equator steer about North until past the Frederick and Geldria shoals, observing in the night not to come under 23 or 24 fathoms between lat. $0^{\circ} 30'$ and $0^{\circ} 50' N.$ to avoid those dangers; if it be day when Pulo Ruig or Ragged island is seen, keep it westward of N.W., and it will lead eastward of these shoals. When abreast of Pulo Panjang, and in soundings of 24 or 25 fathoms water, a N.W. or N.W. by W. course, according to tide, will lead to the entrance of Singapore strait.

CHAPTER VII.

RHIO STRAIT.

VARIATION $1^{\circ} 25'$ East in 1866.

GENERAL DESCRIPTION.—The route from Banka strait to Singapore, outside Linga and through Rhio strait, is the one now commonly adopted by vessels proceeding either way between Sunda strait and Singapore, for the reasons stated at page 3, that Rhio strait is safe, sheltered, and easily navigable, the Dutch Government having placed beacons on many of the dangers; whereas the route outside Bintang is exposed in both monsoons, and the fairway is encumbered with many rocks and shoals, which render it necessary for vessels to keep at a long distance from the land.*

This route is particularly convenient for vessels leaving Singapore for Europe in the N.E. monsoon, and but few vessels now adopt any other. By proceeding through Rhio strait, they avoid the delay and inconvenience so frequently experienced during that season in getting to sea by the main channel of Singapore strait, past Horsburgh lighthouse. In the S.W. monsoon also, vessels are frequently able to proceed to the southward much quicker by this route than by the Outer one.

No good survey of Rhio strait has yet been made. The Netherlands Government published in 1863 a chart constructed on a large scale from the partial surveys of Dutch naval officers, and from which most of the bearings and distances given here have been taken; the chart is, however, still imperfect, and mariners are cautioned not to place implicit reliance upon the directions and description of this strait.†

Owing to the similarity in the appearance of the coasts in Rhio strait it is somewhat difficult for a stranger to recognize the different points and islands, and this is especially the case from the chart exhibiting no topography. Mr. Stanton, commanding H.M.S. *Saracen*, in passing through the strait in 1861, made some observations to assist in recognizing the land, the results of which are embodied in the following description.

* See Charts : Banka Strait to Singapore, No. 2,757, scale $m = 0.15$ of an inch; and Strait of Singapore, Sheet 3, No. 2,404, scale $m = 0.65$ of an inch.

† See Chart of Rhio Strait, with plan of Rhio Roadstead, No. 2,413, scale $m = 0.75$ of an inch, published in 1866.

Rhio strait is bounded on the east by the island of Bintang, and on the west by the chain of islands of which Battam, Rempang, and Galang are the chief; numerous smaller islands and shoals front the main shores on each side of the strait, and very much contract the width of its main navigable channel. The general direction of the strait is N.W. and S.E., extending from about lat. $0^{\circ} 86'$ to $1^{\circ} 12' N.$, and having soundings from 5 to 20 fathoms.

The southern entrance of the strait is about 12 miles wide, but suddenly narrows, so that in advancing 3 or 4 miles to the north-westward, between the Garras and Topies islands, it is only $3\frac{1}{2}$ miles wide. About mid-way of the strait is the island of Pankel, surrounded by a reef extending in some places half a mile off shore, to the westward of which is the principal channel, here not much more than 2 miles wide, bounded on the west by the islets and banks off the north-east end of Galang. The passage eastward of Pankel is obstructed by several reefs and islets, which render its navigation intricate.

To the northward of Pankel, the strait suddenly widens to 8 or 9 miles between Sembolang point, the eastern extreme of Rempang island, and Rhio island on the Bintang shore, the depth here varying from 5 to 12 fathoms. The widening of the strait is caused by the deep bight in the Bintang shore, in which are the islands of Dompas, Rhio, Sengarang, and Oedjang, close to the mainland, and farther out the islands of Penjingat, Terkolei, and Loban at the north-western extreme of the bight, where the strait again narrows to $2\frac{1}{2}$ miles between that island and the islands and banks to the westward. Northward of West point, the western extreme of Bintang, the strait rapidly widens to its northern entrance, where it is about 10 miles wide.

WEST SIDE OF THE STRAIT.

PULO RONDO, or Dumpo, 129 feet high, lies about $1\frac{1}{2}$ miles to the south-east of the south end of Galang island, and may be considered as the south-western limit of Rhio strait. It bears W. by S. $\frac{1}{4}$ S., and is distant about 18 miles from the south-west extreme of Talang island, the south-eastern limit of the strait. It is a remarkable little island, showing very round and bold against the adjacent land, and is one of the most useful objects for recognizing the entrance to the strait when coming from the southward. A patch of $2\frac{1}{2}$ fathoms, named Haai reef, lies a quarter of a mile to the southward of it; and there is a rock about 3 cables distant to the northward.*

* In former Charts a rock was marked awash, nearly three-quarters of a mile in about an E.S.E. direction from Rondo, but the Dutch chart does not show it.

GREAT BANK.—Between the three small islands lying close to the eastward of the south extreme of Galang, and the group of islands lying about 3 miles north-eastward of them, is a deep bay, fronted by a bank, named in the Dutch chart Groote, or Great bank, inside of which is good anchorage in from 4 to 7 fathoms. This bank has $3\frac{1}{2}$ and 4 fathoms water over it, and in the channels between its extremes and the islands, are depths of 6 and 8 fathoms.

There is a bank of 4 fathoms about half a mile S.S.E. from the northern point of the bay.

DIRECTIONS.—From the Dutch chart it appears that this bay may be entered through the south channel, in large ships, by keeping pretty close to the three small islands on the west side of the channel; but the islands must not be passed too close, as rocks project a short distance from them.

To enter by the north channel, bring the western end of the large island Selatan, forming the northern limit of the bay, to bear N.W., and steer in upon that bearing until the south-east point of the island is abeam, when steer West, and anchor when Rondo island bears about S. $\frac{1}{2}$ E.

There does not appear to be less than 4 fathoms water on the extremes of the Great bank, the shoalest water $3\frac{1}{2}$ fathoms being near its centre, consequently a vessel of moderate draught would cross either end with safety.

EAST BANK lies N.E. by N. 5 miles, from Pulo Rondo, its outer part being about three-quarters of a mile S. by E. $\frac{1}{2}$ E. of Tanjong Dempoe, the eastern point of the adjacent islands. It is a little more than half a mile in extent, with $1\frac{1}{2}$ fathoms of water over it, and 10 to 12 fathoms near it.

TJASSENS SHOAL is an extensive bank, with 2 to 4 fathoms water over it, lying between Pulo Tarong (the island close to the northward of Selatan) and the southern part of Great Garras island. On the Dutch chart a safe channel is shown on either side of this bank, but Mr. Stanton states that "the channel between the west shore of Great Garras island and Tjassens shoal, (the southern extremity of which terminates in a reef which dries at half tide,) and which was marked in former charts clear of danger with depths of from $3\frac{1}{2}$ to 7 fathoms in it, is no longer practicable, as it carries but from 2 to 4 fathoms, and has several shoal patches in it." It does not, therefore, seem safe to rely upon the other channel being free from danger.

GREAT and LITTLE GARRAS ISLANDS.—Great Garras island is about 3 miles long, W.N.W. and E.S.E., one mile broad, has a flat summit, and terminates with abrupt points. Close off its north-west point is a shoal, about a mile long, named Garras reef; and a small islet surrounded

by a reef lies in the fairway of the channel between Garras reef and the coast of Galang.

Little Garras is a small triangular shaped island, lying nearly two-thirds of a mile E.S.E. from Great Garras. Both islands are surrounded to a short distance by reefs.

Dittofs reef, lying about two-thirds of a mile South from the eastern extreme of Little Garras, has $4\frac{1}{2}$ to 10 fathoms water close to it.

TARONG POINT, the north-east extreme of Galang island, has on its northern side a small bay, in which is a native village. There appears to be good anchorage under this point between Garras reef and the south bank of the Moeboet shoals in 6 to 8 fathoms water, with the point bearing about N.W., and the above small islet S. by W. to S.S.W.

MOEBOET ISLANDS.—At about $3\frac{1}{2}$ miles N. by W. $\frac{1}{2}$ W. from Great Garras, is the largest and highest of the two Moeboet islands, readily distinguished by its prominent position, and the deep inlets to the westward and southward. It rises to a round peak, with the greatest declivity on the western side; whilst the smaller island, or West Moeboet, is considerably lower towards its centre. In the inlet to the southward of these islands are two prominent rocks, bearing a striking resemblance to boats under sail.

Two reefs, which dry, lie off the south side of the Moeboet islands, and to the south-east of them is a bank of $2\frac{1}{4}$ to 3 fathoms water, named South bank upon the Dutch chart, its outer edge lying S. by E. distant one mile from East Moeboet island.

A bank, named North bank upon the Dutch chart, about half a mile in extent, and only $1\frac{1}{4}$ to 2 fathoms water on it, lies to the north-west of the eastern Moeboet island, its outer edge bearing N.N.W., distant three-quarters of a mile from the east extreme of that island.

An extensive sand-bank with 1 to 2 fathoms over it, also lies in the entrance of the inlet, separating Galang and Rempang islands.

SEMBOLANG POINT, the eastern extreme of Rempang island, is the next prominent object on the western side of the main channel after passing northward of the Moeboet islands. It is fronted by a reef, close to which are 5 to 9 fathoms. From this point the land trends to the westward, very much increasing the width of the strait.

TIEMARA BANK, lying N.W. $\frac{3}{4}$ N. $3\frac{1}{4}$ miles from Sembolang point, and about $1\frac{1}{2}$ miles eastward of Tiemara island, is about half a mile in extent, with 2 fathoms water over it, and 7 to 9 fathoms near it. To avoid it, Sembolang point should not be brought east of S.E. by S., nor the eastern extreme of Little Liemara island to the north of N.W. $\frac{1}{2}$ W.

In the bay between Sembolang point and Tiemara island, the soundings appear to be pretty regular, decreasing from 9 and 10 to 6 and 5 fathoms. Close to the shore lies a reef in a S.W. by S. direction from Tiemara bank, and S.E. from the south extreme of Tiemara island.

TIEMARA ISLAND, the southernmost of the chain of islands which front Boelang strait, between Battam and Rempang islands, is about $1\frac{1}{2}$ miles long, N.E. by N. and S.W. by W., three-quarters of a mile broad, moderately elevated, and when first seen appears like a bold point projecting from Rempang. Between it and the Tiemara bank the depths are 4 and 5 fathoms; between it and Rempang there is no good passage, a large dry shoal occupying a considerable portion of the channel.

LITTLE TIEMARA ISLAND, lying about a mile N. by W. $\frac{1}{2}$ W. from the north-east point of Tiemara island, is about a third of a mile in extent, and surrounded by a reef which on the east side of the island, projects a third of a mile; near the reef are 12 to 17 fathoms water.

Between the Tiemara islands are several reefs, which render the channel unnavigable.

AJER RADJA is the northernmost of four islands lying between Tiemara island and Boelang strait. Horsburgh says that a mile eastward of Radja is a small 2-fathoms patch, named Johannes bank, with 7 to 9 fathoms near it.

ANTON is a small round island with an islet off its north-east point, lying close to the north-east shore of Ajer Radja. A reef surrounds both the island and the islet, to the distance of a third of a mile.

INNANG SHOAL is a small reef of rocks lying at the entrance of Boelang strait, nearly a mile from the south-east side Innang, and limiting this part of Rhio strait to the westward. It is marked by a *beacon* which bears from Little Tiemara island N. by W. $\frac{3}{4}$ W. 3 miles, and from Little Loban island, which limits the opposite side of the strait, W. by N. $2\frac{1}{4}$ miles. Near it are depths of 10 fathoms, and to the southward of it is a small bank of 5 fathoms.

INNANG ISLAND is about $2\frac{1}{2}$ miles long north and south, and $1\frac{1}{2}$ miles broad, and its southern part $1\frac{1}{2}$ miles northward of Ajer Radja, forms the northern side, and Ajer Radja, the southern side, of the entrance to Boelang strait.

A reef fronts this island to the distance of nearly half a mile, and its outer part, abreast the north-east shore of the island, is marked by a *beacon*, which bears from Innang beacon N. $\frac{1}{4}$ E. $1\frac{1}{2}$ miles, and which should not be approached too close.

SAUW ISLAND is nearly as large as Innang, and lies to the northward of it, the channel between them being about a quarter of a mile wide. Inside these two islands are several small islands with channels between them into Boelang strait. A rocky patch lies close to the eastern point of Sauw, and from thence a tongue of rocks and sand extends about $1\frac{1}{4}$ miles in a southerly direction, its extreme bearing E. by N., distant half a mile from the north point of Innang. A vessel will keep clear of these dangers by not bringing the beacon on the reef extending from Innang island at all to the eastward of South.

LITTLE INNANG ISLAND and VAN GOGHS SHOAL.—Little Innang is a small island lying off the north-east part of Sauw, opposite the West point of Bintang, from which it is distant nearly 2 miles. About half a mile N.N.W. of its north-east point is a shoal patch with 2 fathoms over it. Van Goghs islet, surrounded by a shoal which extends south-west from it nearly three-quarters of a mile, lies N.W. by N. from Little Innang. Three-quarters of a mile north-west of the islet is another shoal with only $1\frac{1}{4}$ fathoms breast water over it. All these dangers will be avoided by not bringing the east point of Sauw to the eastward of South, until Senggera, an islet on the opposite coast, bears East. The east point of Little Innang bearing South will keep a vessel clear, but it is rather a close mark, and on no account must the east point of Sauw be shut in with Little Innang when standing towards these dangers, as those objects in line lead very close to the eastern bank. The soundings are too irregular near these shoals to afford a certain guide.

MALANG ORANG SHOAL.—The north-east coast of Battam, from abreast Sauw island to Boerong point, which forms the western point of the north entrance to Rhio strait, is fronted by a reef, extending in places to the distance of a mile from it, and also several dangerous shoals. The Malang Orang shoal, which has a *beacon* on it, lies three-quarters of a mile from the Battam shore, and about E.S.E. from Malang Orang point; it appears to be of small extent, with 5 to 8 fathoms near it.*

PAN SHOAL, lying nearly in the middle of the northern entrance of Rhio strait, is extensive and rocky, and visible at low water, when it appears as a long ridge of black stones. It is marked by *four beacons*, placed on the north, north-east, south-west, and western edges of the shoal. There is a safe passage on either side of the shoal; that on the west side, between the shoal and the Battam shore, is not so wide as the other to the eastward, between the shoal and Bintang; but, with proper caution, it may be adopted if necessary.

* See Chart: Strait of Singapore, Sheet 3, No. 2,404; scale $m = 0\cdot65$ of an inch.

To avoid this shoal, it is best to proceed by the eastern channel keeping within $3\frac{1}{2}$ miles of the Bintang shore, in soundings of 13 or 14 fathoms, to 18 and 20 fathoms towards the shoal; and when Tanjong Nongsa (Boerong point) the northern extreme of Battam, bears W. by N., or Pulo Nongsa is just shut in behind Tanjong Nongsa, a vessel will be to the northward of it, and has entered the strait of Singapore. Barbukit hill kept North or N. $\frac{1}{4}$ W. leads eastward of it; and Johore hill bearing about N. by W. $\frac{3}{4}$ W. leads westward, but dangerously close to the eastward of the Riondo shoal."

There can be no doubt but that the channel eastward of the Pan shoal is much the better channel of the two, being nearly twice as broad as the western one. Between the Pan and the reef outside Skerre island (Doea island) on the Bintang shore, the distance is $3\frac{1}{4}$ miles, and between the Pan and Riondo shoal, it is but $1\frac{1}{2}$ miles. Although the depths, 6 to 10 fathoms, in the western channel are more convenient for bringing up in case of meeting with light baffling winds and contrary tides, yet the bottom is foul, affording but unsafe anchorage, and from which it might be very difficult for a sailing ship to get underweigh in the strong tides which prevail in this locality. Few sailing ships now proceed through the western channel, but it is often made use of by steamers, commanded by officers acquainted with the navigation of the strait. H.M.S. *Saracen* passed through it against the tide, and was nearly set on to the shoal by the wind failing.

RIONDO SHOAL, lying about N.W. $\frac{1}{2}$ W., distant $1\frac{1}{2}$ miles from the Pan shoal, is marked by a small *beacon*. The following account of this danger was communicated by Mr. James Titherington, surveyor for Lloyd's agents at Singapore, August 15, 1853:—

About twelve months since, Captain Riondo reported the position of a shoal in the vicinity of the Little Pan, on which his vessel struck, and received considerable damage; his statement is now verified by the following extracts from the log of the Dutch steamer *Java*, Captain Kemish: "The *Java*, on her last trip to Batavia, rounded the Little Pan—say a quarter of a mile; a course was then steered direct for the west point of Bintang, which would clear the Large Pan about a mile; she soon after struck, going at full steam, carrying away the fore foot, &c.; the bearings at the time were Pulo Nongsa in one with the north extreme of Battam; Bintang hill E. by S. $\frac{1}{2}$ S.; and the beacon on the north end of Large Pan S.E. by E. $\frac{1}{4}$ E."

Pulo Nongsa, a small island about $1\frac{1}{2}$ miles W. by N. $\frac{1}{2}$ N. from Nongsa point, just shut in behind it, leads close to the southward of the Riondo shoal and to the northward of the Pan.

LITTLE PAN SHOAL lies N.W. $\frac{1}{2}$ W. about three-quarters of a mile from the Rioñdo shoal. Pulo Nongsa just open of Nongsa point, leads just clear to the northward; and Sauw point open of Malang Orang point, leads close to the eastward. As there is no occasion to go near this shoal, vessels should give it a wide berth.

It is stated in Horsburgh that a ridge runs off E.S.E. from the Little Pan, and at its extremity there is a rock with 7 feet water on it, where the *beacon* is placed, and that it was not advisable for any vessel to pass to the westward of the beacon. On the Dutch chart for 1863, the beacon is on the northern part of the Little Pan.

EAST SIDE OF THE STRAIT.

TALANG, or Long island, the south-west point of which forms the south-eastern limit of Rhio strait, is irregularly-shaped, nearly 5 miles long north-east and south-west, and about a mile broad. It may be known by a square hillock over its south-east end, 350 feet high, which, with a sharper peak westward of it, forms a saddle. The land from thence to the western end of the island is of nearly the same elevation.

Talang is surrounded by a reef which extends nearly half a mile from some parts of the island, but does not project far from its south-west end. Near the island the soundings are from 10 to 17 fathoms.

GIN, or Great island, described at page 180, lies 2 miles to the eastward of the northern part of Talang, and forms one of the objects which serve to mark the entrance of Rhio strait.

HENDRIK JAN ROCK, on which a Dutch ship of that name struck in February 1861, is a dangerous pinnacle nearly awash at low water, and steep-to, having 9 and 10 fathoms close around it. It lies S.E. three-quarters of a mile from the south-eastern point of Talang, with the summit of South-west hill just shut in by the south-western extreme of Talang.

This rock is of small size, and there was great difficulty in finding it.* Several other shoal patches were found in the channel between Talang and Gin; but they all, except the Hendrik Jan, lie out of the ordinary track of ships, and are dangerous only in the event of this channel being mistaken in thick weather for the entrance of Rhio. Vessels should give these islands a berth of 2 miles in passing, and not bring Terobi island eastward of E. $\frac{3}{4}$ N., until South-west hill comes well open of Talang.

* Stanton.

SIOLON, or Mantang island, 7 miles long E. by N. and W. by S. and $2\frac{1}{2}$ miles broad, lies to the north-westward of Talang, and is separated from it by a channel about $1\frac{1}{4}$ miles wide. On its south-west end is South-west hill, 206 feet high, which, when seen from the southward, appears as a double-peaked hill, terminating to the westward in a point which forms the south-west extreme of the island; but when viewed from the northward, it makes with a peaked top.

At 4 miles eastward of South-west hill is Siolon hill, which has a flat table summit, and is remarkable from its being the highest hill on Siolon. It rises abruptly from the northward to an elevation of 537 feet, and terminates to the southward in a bluff point, close to which is Segai islet, which is lower than the adjacent land. At a distance of 12 miles to the southward, both Siolon and South-west hills, owing to the land between them being low, appear as islands.*

There is good anchorage under the southern shore of Siolon, between South-west and Siolon hills, in from 12 to 9 or 8 fathoms, with shelter from northerly winds.

Siolon Channels.—There are channels on either side of Siolon which will lead out into the China sea, northward of Pulo Gin; but as they are quite out of the ordinary track of vessels, they should not be attempted by any one not locally acquainted. The southern channel, between Siolon and Talang, is about $1\frac{1}{4}$ miles wide, and has depths varying from 12 to 23 fathoms in mid-channel, and from 5 to 9 fathoms near the shore on either side. Some reefs lie at the eastern end of the channel, which render the passage through it somewhat intricate.

The northern channel, between the north shore of Siolon and the coast of Bintang, has several islands and reefs lying along and extending off more than a mile from the Siolon shore. The outer or western of these reefs and islands are named Alligator and Blading reefs, and vessels should not pass eastward of a line drawn from them to Alligator island. Three reefs lie on the northern side of the channel, the outermost of which, Prins reef, is $1\frac{1}{4}$ miles distant from the Bintang coast. The entrance to the channel is between this reef and Blading island, and is little more than $1\frac{1}{2}$ miles wide, with depths of 4 and 5 to 7 fathoms. Inside to the eastward of the three reefs, the shore of Bintang is free from danger, and vessels may anchor at any convenient distance from it, in 12 to 8 fathoms. At the eastern end of the channel are several islands and reefs, which render it, like the channel southward of Siolon, somewhat intricate.

* Stanton.

ALLIGATOR ISLAND, three-quarters of a mile long, north and south, and a third of a mile broad, lies $1\frac{1}{2}$ miles to the north-west of the western end of Siolon. Seen from abeam, it shows as three round lumps, but when approached from the northward, it appears to slope with a gradual declivity from its northern end, which is 162 feet high.

A detached reef lies about a third of a mile to the north-west of the south-west point of Siolon. There is also a rocky patch nearly awash, about a quarter of a mile E.N.E. from the north point of Alligator island; and another patch, having $2\frac{1}{2}$ fathoms over it, about a third of a mile to the eastward of it.

ALLIGATOR REEF, lying two-thirds of a mile North of Alligator island, is nearly half a mile in extent, and its north end is marked by a *beacon*.

BLADING ISLAND, lying $1\frac{1}{4}$ miles to the northward of Alligator reef, is small and surrounded by a reef to the distance of about a quarter of a mile.

Eastward of Alligator reef and Blading island are several other reefs and islands, lying off the northern shore of Siolon.

PRINS REEF, about half a mile in extent N.W. and S.E., lies $1\frac{1}{2}$ miles N.N.W. from Blading, and forms with that island the western entrance of the channel between Siolon and the coast of Bintang. It is the outermost of the three reefs before-mentioned, one of which bears from it East nearly a mile; and the other, which lies close to the Bintang shore, E.N.E. $1\frac{1}{4}$ miles. In the channel between it and the nearest point of Bintang, are 4, 5, and 6 fathoms, and 5 fathoms a mile to the westward of the reef.

The TOPIES are a cluster of small round islets and rocks lying about 2 miles westward of Alligator reef. Topie in the Malay language signifies hat, and when approached from the southward these islets, as they rise above the horizon, certainly present very much the appearance of the round, inverted bason-shaped topies, or hats, in use among the Malays. The northern and southern islands are the largest of the group, and are both about the same height, 112 feet. When approaching the latter from the northward, it appears of a crown shape, and in clear weather may be seen 10 miles off.

A rock lies close off the south-east end of the southern island; and a bank with 3 fathoms water over it, nearly half a mile off in the same direction.

ROTTERDAM REEF is a rocky patch with only $1\frac{1}{2}$ fathoms water over it, lying E.S.E., a little more than half a mile from the northern island of the Topies group.

There is another reef, with but little water over it, lying N. by W. $\frac{1}{2}$ W., nearly half a mile from the same island, and its northern end is marked by a *beacon*. Near these dangers are 6 and 4 fathoms.

SOUNDINGS.—In the channel between the Topies and Alligator island and reef, which forms a part of the inner route to Rhio, the depths are 5 to 8 fathoms, the deepest water being on the eastern side of the channel.

In the channel between the Topies and Garras island, which is the main passage through the strait, the soundings appear to be very irregular. Close to the westward of Rotterdam reef are 4 and $4\frac{1}{2}$ fathoms, with 6 fathoms to the north-west of it. About $1\frac{1}{2}$ miles north-west and south-west of the northern island of the Topies are some patches of 5 fathoms. Near these patches to the westward are 7 fathoms, increasing to 10 and 20 fathoms towards the Garras islands.

A **SHOAL** with $2\frac{1}{2}$ fathoms water over it, and 7 and 10 fathoms around it, lies on the eastern side of the main channel between the Topies and Pankel island, with the east end of Little Garras bearing S. $\frac{1}{2}$ W. $3\frac{3}{4}$ miles, the northern island of the Topies group S.E. by E. $\frac{3}{4}$ E. $3\frac{1}{2}$ miles, and the south-west extreme of Pankel N.W. by W. $1\frac{1}{2}$ miles. The northern Topie bearing E. by S. $\frac{1}{2}$ S., and the south-west extreme of Pankel N.W. $\frac{1}{2}$ N., will lead nearly half a mile to the south-west of this danger.

PANKEL ISLAND, 2 miles long north and south, and half a mile broad, bounds the eastern side of the main channel of Rhio strait, abreast of Great Garras and the Moeboet islands. It is belted by a reef which extends from a quarter to half a mile from it; a rock also lies three-quarters of a mile northward of its north end. This island at a distance makes as two distinct round hills; on a nearer approach a sandy beach will be seen at its south end, from which rocks and fishing stakes extend nearly three-quarters of a mile.*

RUELS BANK, lying about a mile to the eastward of Pankel, has a *beacon* placed on its northern part, from which the north extreme of Pankel bears N.W. $\frac{3}{4}$ W. distant nearly $1\frac{1}{2}$ miles. From the south extreme of the reef the south-east end of Pankel bears W.S.W., distant $1\frac{1}{4}$ miles.

SOMÉ lying E. by N. $\frac{3}{4}$ N. nearly $1\frac{1}{2}$ miles from the north end of Pankel, is a small, round island, covered with cocoa-nut trees, and surrounded by a reef, with very irregular soundings near it.

* Stanton.

SORÉ REEFS.—The south end of these dangerous reefs lie N.N.W. nearly a mile from Soré island; from thence they extend $2\frac{3}{4}$ miles in a north-west direction to the *beacon*, or perch, placed upon their northern extreme, from which Pankel bears S. $\frac{1}{4}$ E. distant $3\frac{1}{2}$ miles; the centre of Terkolei island N. by W. $\frac{3}{4}$ W. $2\frac{1}{2}$ miles; and the west extreme of Penjingat island E. by N. $\frac{3}{4}$ N. $3\frac{1}{4}$ miles.

Captain Caldbeck of the ship *Bencoolen*, which grounded upon one of these reefs in 1841, made a partial examination in the neighbourhood of the perch. He says,* “There seems to be a great rise and fall of tide in Rhio strait; at apparently half ebb there were 2 fathoms round the perch, and at low water the whole of the reef was dry as far as the perch, and to a great extent to the southward; at a distance of 300 yards to the N.W. and N.N.W. of the perch the depths were $5\frac{1}{2}$ fathoms, and about 3 cables’ lengths outside $8\frac{1}{2}$ fathoms; the soundings thence to the N.N.E. and N.E. were very irregular—9, $6\frac{1}{2}$, 10, and 8 fathoms indiscriminately: the reef is composed of rock, sand, broken shells, and coral.”

DOMPA is an irregularly shaped island 3 miles in extent east and west, and $1\frac{1}{4}$ miles north and south, separated from the west coast of Bintang by a channel nearly half a mile wide in which lie some rocks. Its western extreme, named Domba point, bears N.E. by E. 2 miles from Soré, and N. by W. 6 miles from the northern island of the Topies.

Two small islands lie off the south shore of Domba, the western one of which is named Basing, the eastern one Sekatap. Both islands, as also Domba itself, are bordered by reefs which extend from a quarter to a third of a mile from the shore. A *beacon* marks the outer edge of the reef extending from Domba point.

A bank, with $4\frac{1}{2}$ feet least water, and 2 and 3 fathoms on other parts, extends from the south-western shore of Domba. Its outer edge lies nearly three-quarters of a mile S.S.W. from Domba point, and half a mile N.W. $\frac{1}{4}$ N. from the west point of Basing island; near it are 7 and 8 fathoms.

THE CHANNEL between the edge of the bank extending from the south-west side of Domba and Soré, is about 1 mile wide, and is generally used by vessels bound to Rhio from the southward. The depths in it vary from 8 to 15 fathoms, and a little to the eastward of the fair track are 5 and 6 fathoms.

RHIO ISLAND is about $4\frac{1}{2}$ miles in length east and west, and $2\frac{1}{4}$ miles wide, and, being separated from the mainland of Bintang by a very narrow channel, appears to form part of it. The town, which stands on the north-west point of the island, was formerly a port of great trade; and

* Naut. Mag. 1844.

although its importance has for many years declined, it appears to be still a place of considerable traffic for small vessels. There is a well-built fort on a hill commanding the town.

Anchorage; Tides.—The usual anchorage is in 3 or 4 fathoms, about 2 miles northward of the west end of Dompas, sheltered from the northward by the island of Penjingat. The soundings decrease gradually to 4 and $3\frac{1}{2}$ fathoms, but shoal suddenly under a depth of 3 fathoms. It is high water, full and change, at 10 h.; springs rise 7 feet, neaps 5 feet.

PAKKO is a small islet lying about half a mile off the western shore of Rhio island in the middle of a rocky bank about half a mile in extent. There is a narrow channel between the rocky bank and the western shore of Rhio, having $1\frac{1}{2}$ to 2 fathoms water in it, and which is marked on the western, or rocky bank side, by *three beacons*.

PENJINGAT, or MARS ISLAND, lies half a mile westward of the north-west point of Rhio, opposite the town. The island is narrow, about a mile long east and west, a third of a mile broad, and surrounded by a reef which projects from its southern and western sides about a quarter of a mile.

SENGARANG ISLAND is nearly twice the size of Rhio, lying to the northward of it, and separated from it by a channel from half to three-quarters of a mile broad. The western extreme of this island projects some 3 miles to the north-westward of Rhio, forming a roadstead or anchorage between it and Penjingat. Vessels anchoring here—which most of the small native vessels do, on account of being much closer to the town of Rhio—usually enter by the narrow channel between the Pakko reef and the west shore of Rhio, for the entrance to the roadstead from the westward is barred by a shoal with one fathom water over it. There is a large Chinese village on the southern part of Sengarang, opposite to the town of Rhio.

Loz, or Loos, is a small island lying close to the west end of Sengarang, inside the margin of the reef which extends from that island.

TERKOLEI, lying W.N.W. 4 miles from Penjingat, is a flat island, about half a mile in extent, 30 feet high, surrounded by a reef, and, like the other islands of the strait, entirely covered with trees. A bank with 2 and 3 fathoms water on it extends a mile from its west end; and a bank with 2 fathoms over it extends about 2 miles in an E.S.E. direction from its east end. Bintang hill, rising from a broad base, is visible in clear weather throughout the strait; its flat peak bore, when in line with the extremes of Terkolei, N.E. $\frac{1}{4}$ E. and N.E. $\frac{1}{2}$ E.*

MINERVA BANK, on which the ship *Minerva* grounded in 1825, is described† as being composed of hard sand, extending about 200 feet in

* Stanton.

† Horsburgh.

a W.N.W. and opposite direction, and about 60 feet broad. The vessel grounded on the edge of the bank, Terkolei bearing N.W. $\frac{1}{2}$ N., distant $1\frac{1}{4}$ miles. The least water found on it was 2 fathoms, hard sand, and all around 5 fathoms, soft ground. There is said to be a *beacon* on it.

This shoal was formerly supposed to be part of the bank extending E.S.E. from Terkolei; but H.M.S. *Belleisle*, in April 1843, grounded near the above position, when Terkolei bore from N. by W. to N.W. $\frac{1}{2}$ W.; Bintang Saddle N.E. $\frac{3}{4}$ E.; Penjingat E. $\frac{3}{4}$ S., with the town of Rhio just open of it. The bottom was stiff blue mud, with irregular depths from 2 to 7 fathoms around the ship. In many places not more than 4 feet water was found at 2 cables' lengths off the south side of Terkolei, and it was thought there was no safe passage between it and the Minerva bank.

IRENE SHOAL, lying to the north-westward of Terkolei, is about $2\frac{3}{4}$ miles long north-west and south-east, more than half a mile broad, and carries from 1 to 2 fathoms water.

According to the report of Lieutenant J. van Maurik, of the Royal Dutch Navy, the eastern point of the Irene shoal, and the western point of the bank around Terkolei island extends farther out than marked in former charts.* The steep edge of the Irene shoal lies with Radjo point bearing N.E. $\frac{1}{2}$ N.; the southern extreme of Terkolei S.E. by E. $\frac{3}{4}$ E., and the northern extreme E. $\frac{3}{4}$ S. The depth was 3 fathoms at high water, with Radjo point bearing N. by E. $\frac{3}{4}$ E., and northern extreme of Terkolei E. by N. $\frac{1}{4}$ N.

ISABELLA BANK is about $1\frac{1}{2}$ miles long N.W. and S.E., half a mile wide, and has depths over it of $1\frac{1}{4}$ to 5 fathoms. Its shoalest part of $1\frac{1}{4}$ fathoms, which is near its north end, is marked by a *beacon*, from which the west extreme of Little Loban bears N.W. by W. $2\frac{1}{4}$ miles, and Little Tiemara W. by S. $\frac{1}{2}$ S. 3 miles.

LOBAN ISLANDS, lying about a mile northward of the beacon on Isabella bank, form a group of four or five small islands, separated by channels so narrow that they appear as one island. They may be recognized by the gradual rise the largest island takes from its north end to a round hummock in the centre, which with Little Loban, the islet off its west end, present to vessels approaching them from the westward, the appearance of three distinct hills.*

A reef surrounds the whole group, and extends to the distance of a third of a mile from the north-west and south-east ends of the islands, but not farther than 2 cables' lengths from the west end of Little Loban.

DESSA ISLAND.—Between the Loban islands and Bintang are many rocks and dangers, and no vessel should attempt to stand eastward or

* Stanton.

inside a line connecting Little Loban and Dessa, which is a small islet, conspicuous from having a solitary tree upon it, bearing N. $\frac{1}{2}$ W. about $1\frac{1}{4}$ miles from the west end of Little Loban, and S. by W. about half a mile from Bato point, the nearest point of Bintang.

A **Rocky Patch** lies off the north-west side of Dessa, the outer part being distant a third of a mile from it. Little Loban bearing S.S.E. leads westward of the patch, as will also the West point of Bintang if not brought westward of N. $\frac{1}{4}$ W. Not many soundings are shown on the chart near this danger.

BATO POINT is $2\frac{1}{4}$ miles northward of Little Loban, the pitch of the point being about half a mile north-east of the reef lying off the north-west side of Dessa. At Bato point the land recedes abruptly to the eastward.

A **Rocky Patch** lies off the north-west part of Bato point; it is separated by a very narrow channel from the dangers extending from the south end of Boea island. This part of the coast should be approached with caution; care being taken not to bring the West point of Bintang westward of N. $\frac{1}{4}$ W.

BOEA ISLAND, about a mile long, north and south, fronts the bay between Bato and West points, and, with the exception of a round lump which rises in its centre, is lower than the adjacent land. There is deep water in the channel between it and the shore, but its southern end is nearly connected with rocks to Bato point. The island is bordered by a reef. Vessels occasionally anchor off its northern end.

WEST POINT, bearing N. by W. $\frac{1}{4}$ W. $3\frac{1}{4}$ miles from Bato point, is bold pretty close to on the south and west parts, but on the north part a reef begins to extend from the shore and trends away from the point in a northerly direction, passing outside Senggera islet. West point is moderately elevated land presenting a round shelving appearance, and from it the coast line trends to the north-eastward, forming the eastern side of the north entrance of Rhio strait.

The **SENGGERA** are a group of flat rocks, with a single clump of trees upon them, extending three-quarters of a mile off shore. The outer rock is about $1\frac{1}{4}$ miles N. $\frac{1}{2}$ E. from West point. Rocks covered at high water extend a short distance outside the group, and at low water, detached rocks will be seen nearly as far as West point.

DONA is a small island lying N.E. $\frac{1}{4}$ N. 2 miles from Senggera, and close off Kalumpong point. It is of an oblong form, about 80 feet high, and will be recognized by the coast near it receding to the E.N.E., in the direction of the Subong river.

The reef which fronts the coast from West point, passes a third of a

mile outside Doea, and then trends to the eastward, fronting the southern coast of the large bight between Doea and Subong point, and extending as far as $1\frac{1}{2}$ miles from the shore. This bight has many dangers in it. A reef lies about three-quarters of a mile N.N.E. $\frac{3}{4}$ E. from Doea; and about three-quarters of a mile N.E. $\frac{1}{2}$ E. of the reef is a rock above water named the Pap.

OUTER ROCKS are a small rocky group just above water, lying about $2\frac{3}{4}$ miles N.N.E. $\frac{1}{4}$ E. from the west point of Doea island, and $1\frac{1}{2}$ miles S.W. $\frac{1}{4}$ W. from the Crocodile shoal. Inside these rocks are many other dangers, among which a White rock is conspicuous.

CROCODILE SHOAL is the outer of the dangers off this part of the coast of Bintang. It lies N.N.E. $\frac{3}{4}$ E. $4\frac{1}{2}$ miles from Doea island, and W. $\frac{3}{4}$ N. 2 miles from Subong point. There is said to be 3 fathoms water over this danger, and depths of 4 fathoms extend some distance north-eastward of it.

Doea island bearing S.S.W. leads nearly half a mile westward of the Crocodile; and Pulo Nongsa bearing West, leads half a mile to the northward. Barbukit hill N. by W. $\frac{1}{4}$ W., will also lead to the westward.

DIRECTIONS.—To clear the reef and shoal-water which extends north-eastward of Doea island, the west point of that island should not be brought to the westward of South; and to avoid the Outer rocks and Crocodile shoal, Doea should not be brought to the westward of S. by W. $\frac{1}{2}$ W. until Subong point bears S.E. by E.

SUBONG POINT is the north-west extreme of Bintang and the north-eastern limit of Rhio strait. It bears from Doea island N.E. $\frac{1}{4}$ E., about 5 miles, the coast between forming a deep bight, at the head of which is the entrance of the Subong river. A small islet lies off the pitch of the point, and S.W. by W. a third of a mile from the islet is a sunken rock. Some islets also lie close to the coast S.S.E. from the point.

SOUNDINGS.—Rhio strait is too imperfectly sounded, and the soundings shown upon the chart are too irregular to give any useful description of them. It may, however, be observed that in the track through the strait, 20 fathoms will be had at half a mile from the Garras islands, and about 15 fathoms at the distance of a mile, decreasing quickly to 9, 8, and 7 fathoms farther to the eastward. Abreast of Moeboet island are 15 to 12 fathoms, and abreast of Sembolang point 10 to 6 or 5 fathoms, increasing to 12, 15, and 18 fathoms as Tiemara island is approached. From Tiemara to the Loban islands the soundings will deepen to 20 or 23 fathoms, with perhaps occasional casts of 17 or 18 fathoms, and from thence through the remainder of the strait similar deep irregular soundings will be obtained, with casts now and then, probably, of 13 or even 10 fathoms.

DIRECTIONS through RHIO STRAIT to SINGAPORE.—Directions to proceed from Banka strait outside Linga island are given at page 184. A vessel intending to proceed through Rhio strait, and having brought Tanjong Eung, the eastern extreme of Linga island, to bear S.S.W. $\frac{1}{2}$ W., and Great Domino East, should steer about N.W. $\frac{1}{2}$ N., which, if proper care be taken to guard against the effects of the tide, will take her to the fairway of the entrance to Rhio strait, with Pulo Gin—which will be the first land seen on the starboard bow—bearing about N.E. $\frac{1}{2}$ E., or on the starboard beam.

In this track, if the course is duly preserved, the vessel will pass 7 or 8 miles outside Crocodile rock, and 5 or 6 outside the Fly and Pollux, and will have for about half the distance soundings of 15, 14, or 13 fathoms, when the depths will soon increase to 18, 19, or 21 fathoms. These deeper soundings will continue for 7 or 8 miles, when the depths will suddenly decrease to 12, 11, or 10 fathoms, on the sand-bank, page 179, which runs in a S.S.W. direction from abreast of Pulo Gin. The soundings upon this part of the bank do not appear to be very regular, and it would seem that a vessel might get a cast of 19 or 20 fathoms when passing over it. After she is fairly over the bank the soundings will deepen to 15 or 14 fathoms, and continue so for 3 or 4 miles, when they will again become irregular, varying from 12 or 13 to 19 or 20 fathoms, until Pulo Gin is brought on the starboard beam.

The soundings do not give sufficient warning to keep a vessel clear of the Crocodile rock, but in the event of her meeting with baffling or contrary winds or tides and getting over towards this danger, Domino hill, the island lying between the Great Domino and Tanjong Eung, should not be brought to the southward of S. $\frac{1}{2}$ W., until the islet off the north-west end of Great Domino bears S.W. $\frac{1}{2}$ W. The Fly bank and the Pollux rock must not be approached to a less depth than 13 or 12 fathoms.

At night, or in thick weather a vessel, after having brought Tanjong Eung to bear S.S.W. $\frac{1}{2}$ W., and Domino hill East, should steer a N.N.W. $\frac{1}{2}$ W. course for about 23 miles, and then N.W. $\frac{1}{2}$ W. for about 28 miles, which, if proper allowance has been made for the tide, will keep her 10 or 11 miles eastward of the Fly and Pollux shoals, and place her in the fair-way of the entrance to Rhio strait, with Pulo Gin on the starboard beam.

Great difficulty has often been experienced by strangers in making out the entrance to Rhio strait, on account of the numerous islands in its vicinity. The high conical peak of Rodong (page 179) should be made out as soon as possible, that being the first conspicuous object on approaching the strait, and if this can be discerned no difficulty will be found in making out the other points as the vessel proceeds.

Rondo, the small round island, on the west side of entrance of the strait, and to the southward of this, the peak of Rodong, the only hill of this feature in the vicinity, with South-west hill on Siolon, Talang island, and the extreme land to the eastward (Pulo Gin, with a flat peak nears its centre) will, at a distance of 14 miles, readily show the approach to the strait, whilst, at a nearer distance, the Topies, Alligator, and other islands, cannot fail to point out its entrance.

Having brought the south end of Pulo Gin abeam, a N.W. course will lead to the entrance of the strait, and Table hill, which is flat on the summit, and stands on the southern part of Galang island, should be seen a little on the port bow. In entering, borrow towards the islets near Galang, as the Topies, or Five islands, have shoals extending 1 or 2 miles to the S.S.E., and 1 mile from their western sides; the soundings will decrease to 8 and 10 fathoms inside, and in some parts to $5\frac{1}{2}$ or 6 fathoms.

Having arrived abreast of Little Garras, and distant from it about a mile, a N.W. $\frac{1}{2}$ N. course will lead through the fairway of the channel till the Loban islands are abeam, a distance of 16 miles. With Little Loban bearing East, distant a mile, a N. by W. course for 7 miles will take the vessel past the West point of Bintang, which will bear about S.E.; a N. by E. or N. by E. $\frac{1}{2}$ E. course will then lead midway between the Pan shoal and the dangers off the north-west coast of Bintang into Singapore strait.

The mark for passing eastward of the Pan shoal is to bring Barbukit hill N. $\frac{1}{4}$ W. or North, but not to the eastward of North, and to steer that course until Johore hill* bears N.N.W. $\frac{1}{2}$ W., which will lead north-eastward of both Pan shoals. A vessel will be clear of the Little Pan when Pulo Nongsa opens of Nongsa point, and when the passage between the island and the point comes open, she may steer N.W. and W.N.W. as necessary for Singapore road. If the tide is setting to the westward a sailing ship should be careful, especially in light or contrary winds, to get well over on the northern side of Singapore strait, otherwise she will likely be carried by the strong current to the westward of St. John's, unable either to fetch into Singapore road, or, from the great depth of water, to come to an anchor.

If the beacons are seen there will be no difficulty in passing through the channel westward of the Pan shoal, by keeping in the middle of it, the two beacons on the west end of the Pan on the starboard, and the perch or beacon on the Riondo shoal on the port hand. Burbukit hill, bearing

* These hills bear a slight resemblance to each other, being of the same height, and of a pyramidal shape. Barbukit may be recognized by the low land adjoining it; Johore terminates abruptly to the point forming the east entrance of Calder harbour.

N. $\frac{1}{2}$ E. leads through in mid-channel, and so will Mallang Orang point bearing S.W., but the first is a long mark for such a channel, and the second might easily be mistaken, therefore a stranger should not attempt it unless he can well discern the beacons, and other circumstances, such as wind or tide, are favourable.

To WORK through RHIO STRAIT from the SOUTHWARD.—*In standing to the westward* towards the south end of Galang island, a vessel may shoal towards the Great bank (page 188) to 9 or 8 fathoms. To avoid East bank, the south-east extreme of Selatan island should not be brought south of West, until Dempoe point, the eastern extreme of the group, is west of N.W. Rondo island bearing S.W. $\frac{1}{2}$ S. also leads outside of East bank and all other dangers between that island and Dempoe point, and appears to be a good tacking mark.

Between Dempoe point and Little Garras a vessel may stand into 8 or 7 fathoms, but to avoid Dittofs reef, the eastern point of Galang, which projects into the bay, must not be brought south of West, until the right extreme of Great Garras is open of Little Garras. Little Garras should not be approached nearer than half a mile, nor Great Garras than a mile, to avoid their reefs: the soundings near them are deep, 14 to 22 fathoms.

Between Great Garras and East Moeboet island, a vessel may stand into 8 or 7 fathoms, but a good tacking mark appears to be to keep Little Garras just open of Great Garras, and if this be attended to, it will keep the vessel clear to the eastward of the bank which lies about $1\frac{1}{4}$ miles southward from Moeboet.

After passing Moeboet, its eastern extreme must not be brought eastward of South, until the southern extreme of Sembolang point bears West, when the vessel will be clear of the bank which extends N.N.W. of Moeboet; from thence to Sembolang point she may stand into 8 or 7 fathoms.

Sembolang point is fronted by a reef, but may be passed at a quarter of a mile. The bay between that point and the Tiemara bank seems to be free from danger, and a vessel may stand into it as convenient, but be careful not to bring the south-west extreme of Tiemara island to the south of West, nor the eastern extreme of Little Tiemara to the north of N.W. $\frac{1}{2}$ W., in order to avoid the Tiemara bank, over which there is a little less than 2 fathoms water.

Little Tiemara should not be approached nearer than half a mile, on account of dangers which extend nearly that distance from it, and close to which are 12 to 17 fathoms, so that the lead cannot be relied upon to give warning in sufficient time. After passing this island, its north-east extreme kept to the southward of S.S.E. $\frac{3}{4}$ E., will serve as a good tacking

mark as far as the beacon on the Innang shoal, leading outside the Johannes bank (page 190), and clear of all danger.

A beacon marks the dangerous reef which extends nearly half a mile from Innang island, but in the event of this beacon having disappeared, the north-east point of Little Innang must be opened of the eastern extreme of Sauw island after passing the Innang shoal beacon, and if this be attended to a vessel will keep outside of all danger as far as the eastern extreme of Sauw, which should not be approached nearer than half a mile on account of the small reef off it.

After passing Little Innang, in standing to the westward, do not shut in the eastern extreme of Sauw island behind Little Innang, which will lead safely along that side of the channel as far as the beacon on the Malang Orang shoal, in about 10 fathoms water. If this beacon should have disappeared, Sauw point, the point next to the southward of the shoal, if not brought south of S.W. $\frac{1}{2}$ W. will lead clear of that danger.

Sauw point, if not brought south of S.W. $\frac{1}{2}$ W., will also lead clear of the south-eastern side of the Pan shoal; and when passing to the eastward of that danger, care must be observed not to bring Barbukit hill to the eastward of North, until Johore hill bears N.N.W. $\frac{1}{2}$ W.; and then not to bring the last-named hill to the northward of N.N.W. $\frac{1}{2}$ W. until Pulo Nongsa is open of Nongsa point.

In standing to the eastward towards Talang island, at the southern entrance of Rhio strait, be careful to give the south-eastern shore of that island a berth of 2 miles, and to keep South-west hill, on Siolon island, well open to the westward of Talang, to avoid the Hendrik Jan rock, which is awash at low water. The south-west point of Siolon and Alligator island may be approached to half a mile. When nearing the Topies, South-west hill kept well open of the southern point of Alligator island, will lead southward of all danger on that side of the group; and, in order to keep to the westward of Rotterdam reef, the south-western extreme of Pankel must not be brought to the westward of N.W. $\frac{1}{2}$ W.

It is not advisable to stand over between the Topies and Pankel, on account of the Rotterdam reef; the reef which lies N. by W. $\frac{1}{2}$ W. nearly half a mile from the northern island of the Topies group; and the shoal of $2\frac{1}{4}$ fathoms lying S.E. by E. nearly $1\frac{1}{2}$ miles from Pulo Pankel. But if it should be found advantageous to stand over, take care not to bring the beacon on the shoal, northward of the Topies, to the north of W.N.W., which will lead northward of Rotterdam reef. If the beacon cannot be discerned, it will be prudent not to stand too near the Topies; however, the southern extreme of Little Garras, if not brought westward of S.W. will lead clear of the dangers west and north-west of those islands.

The $2\frac{1}{2}$ -fathoms shoal, south-east of Pankel, will be avoided by keeping the south-west extreme of Pankel to the northward of N.W. $\frac{1}{2}$ N.; and the northern Topie island, if not brought south of E. by S. $\frac{1}{2}$ S., will lead to the southward.

It does not seem safe to use the channel between the $2\frac{1}{2}$ -fathoms shoal and Pankel, for it has been but imperfectly sounded, and the chart shows a patch of 4 fathoms in the single line of soundings which it exhibits. The south-west end of Pankel should not be approached nearer than three-quarters of a mile, and a good berth should also be given to its western side, where there is a large space which has not been sounded over.

Between Pankel and the Isabella bank, a vessel may stand well over in depths of 8 or 9 fathoms; but not to bring the north end of Pankel to the southward of S.E. by S., to avoid the Soré reefs; nor to bring Terkolei island to the northward of N. by E., to avoid the Minerva bank. Terkolei bearing E. by N. will lead south-eastward of the tail of Isabella bank; and the western extreme of Little Loban, if not brought west of N.W. $\frac{1}{2}$ N., will lead clear of the south-west side of that danger.

Little Loban should not be approached nearer than half a mile, and, after passing it, the western extreme should not be brought south of S. by E. $\frac{3}{4}$ E., until Bato point bears East, which will avoid the dangers near Dessa island. Bato point is bold close-to, but on account of the reef which lies north-westward of it, should not be approached nearer than half a mile. Boea island may be approached to half a mile, but not nearer, on account of the reef which fronts it, and near to which are 8 and 10 fathoms. West point of Bintang is bold, and may be approached to a quarter of a mile, but a reef begins at this point which, extending outside Senggera island, fronts the whole of the north-west coast of Bintang. Senggera may be approached to a quarter of a mile, but Doea island not nearer than half a mile. Very close to the edge of the bank which fronts this part of the coast are 7 and 8 fathoms.

After passing Doea island it should not be brought west of South until it is at least a mile or $1\frac{1}{2}$ miles distant, or if the Pan beacons can be seen, when they bear W. by N., on account of the reef which lies about three-quarters of a mile N.N.E. $\frac{1}{4}$ E. from Doea. Being to the northward of this reef, Doea may be brought S. by W. but nothing to the westward, until Subong point bears S.E. by E., by which means a vessel will avoid all the dangers off the north-west coast of Bintang, including the Crocodile shoal.

DIRECTIONS through RHIO STRAIT from SINGAPORE.—The ebb tide from Singapore meets the flood setting through Rhio strait about the

Pan shoals ; vessels therefore weighing at high-water from Singapore will will carry a fair tide through both straits.

The flagstaff on Fort Canning at Singapore bearing West, leads 2 miles southward of the Johore shoals ; and when Johore hill bears North, a vessel will be eastward of them. Entering Rhio strait, pass eastward of the Pan shoals, and to do so, be careful not to bring Johore hill to the northward of N.N.W. $\frac{1}{2}$ W. until Barbukit hill bears North. (*See footnote, page 203*).

After passing the Pan shoal a course from S. $\frac{1}{2}$ W. to S. by W. $\frac{1}{2}$ W., according to the distance that danger is passed, will lead down the fairway of the strait until the vessel has arrived nearly abreast of the West point of Bintang, when S. by E. is the mid-channel course as far as the Loban islands. From thence a course about S.E. $\frac{1}{2}$ S. allowing for tide, will lead midway between Pankel and Moeboet, and between the Garas islands and the Topies, and out of the strait.

TO WORK through RHIO STRAIT from the NORTHWARD.—In rounding the Pan shoals, take care not to shut Pulo Nongsa in behind Nongsa point, until Johore hill bears N.N.W. $\frac{1}{2}$ W., and then not to bring Johore hill to the northward of that bearing until Barbukit hill bears N. $\frac{1}{4}$ W. or North. The last named hill must not be brought at all to the eastward of North when on the east side of the Pan shoal.

Standing towards the north-west coast of Bintang,—to avoid the Crocodile shoal Barbukit hill should not be brought west of N. by W. $\frac{1}{4}$ W., or, in case Barbukit cannot be seen, Doea island must not be brought west of S. by W. This last precaution will lead clear of the Outer rocks, which lie S.W. $\frac{1}{4}$ W. $1\frac{1}{2}$ miles from the Crocodile. The soundings about here are very irregular, decreasing suddenly in some places from 13 to 5 or 4 fathoms, and it will be well for large ships not to bring Doea island west of S. by W., while smaller vessels may bring it as far, but not farther westward than S.S.W. As Doea is approached it should not be brought west of South, to avoid the reef which lies N.N.E. $\frac{3}{4}$ E. three-quarters of a mile from it.

Doea may be approached to half a mile, and Senggera to a quarter of a mile ; but the reef fronting this part of the coast has depths of 8 or 7 fathoms close to, and it must be given a berth from three-quarters to half a mile until up with West point, which is pretty bold close-to. A reef projects from Boea island, which must not be neared under half a mile. S.S.W. of Boea is a reef, and N.N.W. of Dessa island is another ; but it appears that all danger between Boea and Little Loban will be avoided by keeping the west end of the latter island east of S. by E. $\frac{3}{4}$ E.; or by not bringing the West point of Bintang west of N. $\frac{1}{4}$ W.

Standing to the westward,—when near the south side of the Pan shoal,

Sauw point should not be brought south of S.W. $\frac{1}{2}$ W., which will clear the Pan, and also the Malang Orang shoal, in case the beacon upon this danger should have disappeared. From Malang Orang beacon to Sauw island, keep the east point of Sauw open of Little Innang, to avoid the dangers which lie north-westward of Sauw.

The eastern point of Sauw is pretty bold on its northern side, but on its southern side is a small reef, distant from it nearly a quarter of a mile, which should be given a wide berth, and after passing it be careful to keep the eastern extreme of Little Innang open of the east extreme of Sauw, to keep clear of the long spit which projects from the latter island; and also to avoid the reef extending from Innang, in case the beacon which ordinarily marks it should be gone. Close to the beacon are 8 or 7 fathoms, and 14 or 15 fathoms about half a mile off.

The same objects in line will serve to guide the vessel safely until she has passed the Innang shoal beacon, towards which, if desirable, she may stand a little closer, after which keep the east extreme of Little Tiemara south of S.S.E. $\frac{3}{4}$ E., to avoid the Johannes bank. Little Tiemara is fronted by a reef, and should be given a berth of at least half a mile. After passing this island, the Tiemara bank will be avoided by not bringing the north-east extreme of that island to the north of N.W. $\frac{1}{2}$ W., until the south-west extreme of Tiemara is north of West, when she may stand into the bay towards Sembolang point as convenient, tacking in 8 or 7 fathoms.

Sembolang point may be neared to a quarter of a mile in 10 or 9 fathoms. After passing it do not bring its south extreme to the north of West until the eastern extreme of East Moeboet island bears South, to avoid a bank which extends N.N.W. of that island. Between East Moeboet and Great Garras a vessel may stand into 8 or 7 fathoms; but a good mark for tacking is to avoid shutting in Little Garras with the east extreme of Great Garras, and this will also keep the vessel clear of the bank, which lies about $1\frac{1}{2}$ miles to the southward of Moeboet.

Neither of the Garras islands should be approached nearer than half a mile, for reefs extend from both. After they are passed, keep the eastern extreme of Great Garras open of Little Garras until the east point of Galang, which projects into the middle of the bay to the southward, bears West, in order to clear Dittoffs reef. Tjassens shoal, which fills up a great portion of this bay, may then be approached to 9 or 8 fathoms.

Having passed Dempoe point, do not bring it north of N.W., until the south-east extreme of Selatan is north of West, which will keep the vessel clear of East bank. From thence towards Rondo island, stand into 10 or 9 fathoms, and towards the Great bank into 9 or 8 fathoms. Rondo bearing S.W. $\frac{1}{2}$ S. appears to be a good mark for tacking when standing

inshore between Dempoe point and that island, leading clear of all danger including East bank.

Standing to the eastward,—Little Loban should not be approached nearer than half a mile, and after passing it, keep its west extreme north of N.W. $\frac{1}{2}$ N., to clear the west side of Isabella bank. The south-east tail of the Isabella will be avoided by not bringing Terkolei to the east of E. by N. Terkolei, if not brought north of N. by E., will lead clear of Minerva bank; and the Soré reefs will be avoided by not bringing the north end of Pankel south of S.S.E. The general depths in the bay between Isabella bank and Pankel are 9 or 8 fathoms.

A reef surrounds Pankel, and it will be well not to stand too near its northern and western sides, as the chart shows but few soundings in those directions from the island. A reef also extends nearly half a mile from its south-west extreme, which should be given a berth of at least three-quarters of a mile. After passing Pankel, keep its south-west extreme to the north of N.W. $\frac{1}{2}$ N., to avoid the $2\frac{1}{4}$ -fathoms patch which lies S.E. by E., distant $1\frac{1}{3}$ miles from that island. It is possible to stand over between this patch and the Topies, but it would not be prudent to do so, as dangers lie near those islets, which may all be avoided by keeping the south-west extreme of Pankel to the north of N.W. $\frac{1}{2}$ W.

To the southward of the Topies, Alligator island may be approached to half a mile, and a vessel may stand on well into the channel between Siolon and Talang. There are many shoal patches between Talang and Pulo Gin, but they all, except the Hendrik Jan rock, awash at low water, lie out of the track of ships. The south-east side of Talang should be given a berth of at least 2 miles in passing, keeping South-west hill *well* open of Talang, until Pulo Terobi bears E. by N.

DIRECTIONS to RHIO from the SOUTHWARD.—Vessels bound to the anchorage off Rhio, having entered the strait (page 203), and being on the western side of the channel about a mile eastward of Little Garras, should steer N. by E. or North, according to circumstances, and pass between Rotterdam reef and the shoal of $2\frac{1}{4}$ fathoms, which lies $1\frac{1}{2}$ miles south-eastward of the south end of Pankel. In this track the soundings will be 15 and 12 fathoms, and shortly afterwards 9, 8, 7, and 6 fathoms. Passing nearly a mile eastward of the beacon on Rupels bank, a course about N. $\frac{1}{2}$ E. will lead in mid-channel between Soré island on the west, and the western end of Dompia island on the east, up to the anchorage in Rhio road. In this last part of the vessel's track she will have 8 or 9 fathoms abreast of Rupels reef beacon, and 9, 10, and 11 fathoms till abreast of Soré, if she preserve the fair track; but if she should borrow at all to the eastward when abreast of Rupels reef beacon, the soundings will shoal to 6 or 5 and probably $4\frac{3}{4}$ fathoms, 11056.

but not less. The soundings will also shoal to 5 and probably $4\frac{1}{2}$ fathoms if she borrow too near the south-east part of Soré island. Between Dompá and Soré the depths are from 11 to 15 fathoms, decreasing, after passing Dompá, to 10, 9, 8, and so on, towards the anchorage.

But a vessel entering Rhio strait from the eastward may steer for Alligator island, and pass between it and the Topies, taking care to keep over towards Alligator, not farther than a mile from it, to avoid the dangers which extend more than half a mile south-eastward of the Topies. Having brought the beacon on Alligator reef to bear East or E. by S., and being about a mile from it, a course about N.W. $\frac{1}{2}$ N. will lead up to the entrance of the channel between Soré and Basing island; when proceed as before directed. Three or four miles southward of Alligator island a vessel following the above directions will have 13 to 9 fathoms. Two or three miles S. by E. from Alligator island are some patches of 5 and 6 fathoms, but no dangers apparently. Between Alligator island and the Topies 7 to 10 fathoms, deepening to 15 or 18 fathoms near Alligator island, and decreasing to 7, 6, or 5 fathoms towards the Topies. After shaping a N.W. $\frac{1}{2}$ N. course, a few casts of $4\frac{1}{2}$ fathoms might be had (for some soundings of that depth appear on the Dutch chart in the fairway between the Topies and Blading island), but would soon deepen again to 6 and 7 fathoms, and continue to have the latter depths, till near the channel between Soré and Dompá, when the soundings will deepen as before.

DIRECTIONS to RHIO from the NORTHWARD.—Having entered Rhio strait as directed at page 206, and having arrived about a mile to the westward of Little Loban, a south-easterly course should be steered, taking care to give a good berth to the Isabella bank, on the north-west end of which is a beacon. When this beacon bears North, distant about a mile—which is a very good distance to pass it on that bearing, as the bank trends to the south-eastward—a course from W. $\frac{1}{4}$ S. to W. by S., according to tide, will lead about midway between the Minerva bank and the beacon on the north end of the Soré shoals, and up to the anchorage in Rhio road.

When leaving Rhio for the Northward, Mr. Bradley, Master of H.M.S. *Belleisle*, recommends vessels to keep the flagstaff of the upper town open to the southward of the highest part of Penjingat, until Little Loban bears N.W. $\frac{1}{2}$ N. or N.W. by N., which bearing will clear the shoals.

CHAPTER VIII.

VARELLA AND DURIAN STRAITS.

VARIATION $1^{\circ} 20'$ East, in 1866.

GENERAL REMARKS.—Vessels bound from Banka strait to Singapore during the strength of the N.E. monsoon frequently adopt the Inner route by the Varella and Durian straits (*see* page 3). During the prevalence of strong northerly winds in the months of December and January, sailing vessels will save much time by doing so,* for here they will have smooth water, good anchorage, and but little tide, whereas on the eastern side of Linga at this season of the year, there is generally a heavy sea, and a southerly current sometimes running at the rate of 3 knots an hour. In Varella strait they will also be greatly assisted by the squalls from the Sumatra coast.

Varella, or Brahalla strait, is situated at the southern part of this route, and Durian strait at its northern part; the intermediate portion has not received a specific denomination. The entire route is about 120 miles in length from Pulo Varella to the Carimon islands, and is bounded on the western side by the coast of Sumatra, False Durian, Sabon, and the contiguous islands; and on the eastern side by Sinkep and the other islands off the south and west coasts of Linga, and by Great and Little Durian, and the adjacent islands.†

SUMATRAS.—The following useful observations upon the Sumatras, or heavy squalls which are common in these straits, are by Captain McKenzie :‡—"On the west side of Sinkep and Linga, and through Durian strait, there will be regular tides, and good slants of wind with the Sumatras. It often falls calm before they come, and if the tide is foul, a kedge that could be handily weighed would be sufficient to drop, and the canvas then reduced; double reefed topsails will do for the first puff, and nothing is lost by being prepared for a heavy gust, as I have passed, and seen many country vessels pass, strangers in the straits of Malacca, in the height of a Sumatra, that have been kept before the wind with all their canvas flying about, and of course running dead to leeward, whilst the country vessel

* Stanton, 1860.

† *See* Charts :—Banka Strait to Singapore, No. 2,757, scale $m = 0.15$ of an inch; Linga and Sinkep Channels, No. 1,789, scale $m = 0.10$ of an inch; and Singapore Strait, Sheets I. and II., No. 2,402 and 2,403, scale $m = 0.65$ of an inch.

‡ Nautical Magazine, 1847.

was running her course under snug canvas; and at daylight the other vessels were out of sight astern."

TANJONG JABOENG.—The coast of Sumatra from Batakarang point to Tanjong Jaboeng, or Cape Bon, has been described at page 172. Tanjong Jaboeng, in lat. $0^{\circ} 59' S.$, long. $104^{\circ} 25' E.$, is the south-eastern limit of the Inner route. Like most other parts of the east coast of Sumatra, it is low land, and has a shoal-water bank extending more than a mile from it.

VARELLA, or BRAHALLA, is a small island 450 feet high, having a hill on its western part which may be seen 20 miles. It lies in the middle of Varella strait, and bears from Tanjong Jaboeng, N. by E. $\frac{1}{4}$ E. nearly $9\frac{1}{2}$ miles, and from Pulo Taya, W. by S. 30 miles.

Horsburgh says, that there are some islets and rocks near Varella, the largest of which, Anak Varella, lies about a mile north-eastward of it, having 7 to 9 fathoms water between it and the principal island; and a mile north from Anak Varella lies a rock, with 17 fathoms close to it, having a channel 2 miles wide, with 10 to 16 fathoms, between it and the Middle rocks.

Water.—Horsburgh also states that there is anchorage on the south-west side of Varella, and water may be procured; but this only ought to be done in case of necessity, as the lurking piratical proas have been known to assault and massacre the crews of boats sent on shore to procure water at this island. The ship *Hercules* was attacked by seventeen large proas near this place, and narrowly escaped being taken by them.*

SHOAL.—Captain G. Kunst, of the Dutch barque *Louisa Kroon Prinses of Sweden*, reports having seen a shoal, with but 12 feet water over it, from which Varella island bore W.N.W., distant 3 miles.†

MIDDLE ROCKS lie $4\frac{1}{2}$ miles N.E. by N. from Varella, or nearly midway between the latter and the islets which front the south end of Sinkep island.

POLLUX ROCK, with only 4 feet water over it, lies nearly 2 miles

* Although piracy has very much decreased in these seas since Horsburgh's time, and, as a general rule, but little danger need now be apprehended from piratical fleets, yet Llanun pirate proas have been known to pass through Banka strait within the last few years. It is still, in fact, very necessary indeed for merchant vessels which have occasion to fill up water in out of the way places to be on their guard against surprise. Natives, not ordinarily pirates, frequently become such if a good opportunity present itself, and merchant vessels offer such rich prizes, that the natives of almost any part of the Eastern seas would very likely be tempted to attack them, if they saw a favourable opportunity for doing so successfully, when many of the crew were away from the ship watering.—J. W. Reed, Master R.N., 1864.

† Singapore Straits Times, 10th September 1864.

N.E. of the Middle rocks, and from it the nearest of the islets southward of Sinkep bears N. by W. $3\frac{1}{2}$ miles, and Anak Varella islet S.W. $\frac{1}{2}$ S. nearly $5\frac{1}{2}$ miles.

CHANNELS.—The channel southward of Varella island is wider and more free from danger than the channel northward of it, and is consequently much more frequented. The shoal bank fronting Tanjong Jaboeng, projects about 8 or 9 miles north-westward from it, forming a sort of elbow, to avoid which it will be necessary to keep Tanjong Jaboeng to the south of S.E. $\frac{1}{2}$ S., until Varella island is east of E.N.E.

The channel to the northward, between Varella and the small islands contiguous to the south-east end of Sinkep is encumbered with the dangers just mentioned. Between the Pollux rock and those islands it appears to be clear, although the chart has but few soundings. Between Varella and Boekoe point, the south extreme of Sinkep, the channel is about 10 miles wide, with depths of 12 or 14 fathoms on either side, and 15 to 20 fathoms in mid-channel.

SINKEP, the easternmost of the three islands forming the north side of Varella strait, is about 17 or 18 miles in extent, and of very irregular shape, projecting to a point on its east side, another on its south-east side, and a third on its south side. Between these points are rather large bays, the most southern one, Baroe bay, being 3 miles deep. On the eastern side of the island is a range of hills, with a peak 1,440 feet high near the centre of the range. There is a hill over Boekoe point, and 4 miles to the northward of it, on the west coast of the island, is a sharp peak of moderate elevation. From Boekoe point the coast line takes a north-westerly direction for 14 miles to Saboyoro strait, which separates Sinkep from the island next westward of it. Rocks above and below water front the whole south-west coast of Sinkep, to the distance of a mile.

Saboyoro strait is about two miles broad, but its entrance is contracted to half that breadth by reefs projecting from the points of Sinkep and the island westward of it. This strait is very imperfectly delineated upon the chart, and no soundings are given to guide a vessel through.

Rawa is the outer of two islands westward of Sinkep, their south-west coast line following the same north-west direction as that of Sinkep, the whole distance, from Boekoe point to the north-west extreme of Rawa being 23 miles. The islands are separated by a channel so narrow that they appear as one. Shoal water extends 2 miles from the south-east point of the eastern island, but gradually lessens in distance from the shore to the north-westward, until at the north-west end of Rawa it projects only a quarter of a mile.

SINKEP LAOET is the outermost of four or five small islets lying about $2\frac{1}{2}$ miles off the south-east point of Sinkep.

SEERA, or Reef island, is small, 160 feet high, and lies E. $\frac{3}{4}$ N. $6\frac{1}{2}$ miles from Boekoe point, and N.W. $\frac{1}{4}$ N. 14 miles from Varella island. Horsburgh describes it as a flat, low island, sometimes mistaken for Varella when coming from the northward. There are three small islets off its north-west end, and one off its south end, inside the edge of a reef which surrounds the island, and extends more than a mile from its east end, and more than 2 miles from its north-west end.

At 4 miles W. by N. $\frac{1}{2}$ N. from Seera, is a patch having 4 fathoms least water over it.

ANAK SEERA are rocky islets lying about $2\frac{3}{4}$ miles N. by E. from Seera, with a safe channel between them and the latter island, and also between them and the coast of Sinkep. A bank with 2 to 3 fathoms water over it, extends from them about 2 miles in a north-westerly direction.

Some patches of $4\frac{1}{2}$ and 5 fathoms, lie from 4 to 6 miles N.W. by N. from Anak Seera, having, apparently, a channel between them and the reef extending from Sinkep.

SPEKE ROCK, on which a ship of this name struck, lies W. by N. $\frac{1}{4}$ N., 9 miles from Seera island, and S.E. $5\frac{1}{2}$ miles from the southern Alang-Tiga island. It is of small size, and a portion of it uncovers at two-thirds ebb, showing as a small black rock about the size of a boat. Close to are 10 fathoms water. Boekoe point kept open to the southward of Seera island, E. $\frac{1}{4}$ S., leads to the southward, and the southern Alang-Tiga island bearing N.W. by N. leads to the westward.

There is a safe passage between the Speke rock and Seera island, and also between the Speke rock and the Alang-Tiga islands, on the east side of the Alang-Tiga. The soundings in this passage are generally from 7 to 9 fathoms, muddy bottom, sometimes sand; but the western channel is preferable on account of the Atkin rock.

ATKIN ROCK, on which the brigantine *Bob Tail Nag*, Capt. Atkin, struck in May 1863, is a pinnacle which uncovers at two-thirds ebb. At low tide the rock is about the size of a ship's launch, and has deep water all round :* when covered, unless the tide is running strong, there is no indication of it. The marks for the rock are, the west extreme of the north Alang-Tiga island just shut in by the east extreme of the middle island, and the south extreme of the southern island bearing N.W. by W. $\frac{3}{4}$ W., distant three-quarters of a mile.

ALANG-TIGA ISLANDS, bearing N.W. $\frac{1}{2}$ W. 29 miles from Varella, are a group of five small islets, and some rocks above water. The three principal islands are high, and may be seen 24 or 25 miles, and

* H.M.S. Rifleman, in February 1864, searched in vain for this rock.

the others 13 or 14 miles from the vessel's deck. There are 7 fathoms close to the islands; and half a mile off the north end of the southernmost lie two rocks, each about the size of a long-boat. When bearing N.N.E., and N. by E., the islands are in one with each other, and they open when the southernmost bears N. by W. $\frac{1}{2}$ W.

These islands may be passed at any prudent distance on their western side; the depths being mostly from 6 to 9 fathoms, mud, in the fair channel. In working, the coast of Sumatra may be approached to 6 fathoms water, and from this depth to 8 or 9 fathoms towards the islands is a fair track, although the soundings are not always regular, 7 fathoms being the general depth directly westward of the islands until near the mainland.

SILENGSENG, or Green island, is an islet 119 feet high, lying $2\frac{3}{4}$ miles north-westward of Rawa island, being separated from it by a safe channel with depths of 10 to 19 fathoms. The islet is surrounded by a shoal which extends farthest from its north extreme, where it projects three-quarters of a mile.

WRIGHT ISLAND, or Boenta, is a small islet lying $1\frac{1}{2}$ miles northward of Silengseng. Some rocks appear to extend about a quarter of a mile from it.

JAMBIE RIVER.—From Tanjong Jaboeng (page 212) the coast of Sumatra trends in a westerly direction to Jambie point, from whence it falls back to the south-westward, to the principal entrance of the Jambie river, also named on the chart the river Nioer. There are, however, between this entrance and Tanjong Jaboeng, several other entrances, off the mouths of the two easternmost of which lies an island named Berba.

The chart does not show many soundings off the main entrance of the Jambie, but there appears to be good anchorage in 6 to 8 fathoms, 7 or 8 miles northward of its mouth. The river is barred, and has a depth of $1\frac{1}{2}$ fathoms over the bar, and 4 to 8 fathoms inside.

There are several towns and villages on the banks of this river, the principal of which is Simpang about 20 miles, and Jambie about 50 miles from the entrance.

This part of Sumatra is under the Dutch, who have a station and fort at Moeara Kompeh, a town 5 miles above Simpang.

Coal.—A fine seam of coal has (in 1860) been discovered near the Sultan's house at Jambie. It is said to be 12 feet thick, close to the river, and at some distance below the surface quite equal to English Newcastle coal.

BASSO, or BAKAUW POINT, in lat. $0^{\circ} 20' S.$, $103^{\circ} 47\frac{1}{2}' E.$, is the south-east extreme of Basso island, which projects in the form of a

peninsula from the main coast of Sumatra in an E.N.E. direction about 13 or 14 miles, its breadth being about 5 or 6 miles. It bears N.W., and is distant about $52\frac{1}{2}$ miles from Tanjong Jaboeng, the coast line between falling back into a large bight, 33 or 34 miles deep, the main entrance to the Jambie river, just described, being situated at its head.

The eastern face of Basso island should not be approached nearer than about 2 miles, as a shoal, steep-to, projects nearly a mile from it.

AMPHITRITE BAY and INDRAGIRIE RIVER.—Amphitrite bay is a large bight about 16 miles deep, formed between the north-east extreme of Basso island, and Baroe, or Dato point, 15 miles to the northward. The bay is nearly filled by a shoal, which extends several miles from either shore. It projects in a N. by W. direction (Horsburgh says N. by E.) for 5 or 6 miles from the south point of entrance, but it curves away more gradually from the north point, and between these projections is the deep-water portion of the bay, about 3 or 4 miles broad.

The large river Indragirie discharges itself through several channels into Amphitrite bay, and also into the bay between Tanjong Jaboeng and Basso island.

CAUTION.—The outer edges of the shoal extending from the points of entrance to Amphitrite bay, especially from the southern, is steep-to, having 10 or 11 fathoms within half a mile of it in some places, then quickly 5 or 4 fathoms, to $1\frac{1}{2}$ or 1 fathom upon it, which requires great attention to the lead, when approaching this part of the coast in the night.*

Horsburgh says that Dato point may be approached to $1\frac{1}{2}$ miles, or to 8 or 9 fathoms, but the point itself appears upon the chart to be steep-to, and to shoal suddenly under 12 fathoms.

The SUMATRA COAST.—All this part of the coast of Sumatra is flat low land, thickly wooded with trees about 120 feet high.

From the low headland of Dato point, the coast runs N. by W. and N.N.W. towards the strait of Durian, and is fronted by a shoal bank from 2 to 6 miles off shore, which may be approached by the lead, as from 10 fathoms upon its edge the soundings gradually decrease to 6, 5, 4, and 3 fathoms.

CHANNELS between SINKEP and LINGA ISLANDS.—Ponoebo island, 5 or 6 miles long, east and west, 2 miles broad, and having a hill 955 feet high near its centre, lies between Sinkep and Linga, dividing the passage between those islands into two channels, named Lima and Ponoebo straits.

Lima Strait, between Ponoebo and Linga, is narrow, much encumbered with islets and dangers, and does not, upon the chart, appear to

* Horsburgh.

be a very convenient channel for navigators unacquainted with it. Captain McKenzie, however, says* that it is safe and quickly passed through with the tide; and that on its western side, just beyond the narrows, there is a small bay on the Linga shore, with good anchorage, wood, and water.

Horsburgh states that Lima strait is a short route from Linga road to the strait of Durian, the soundings in it varying from 7 to 14 fathoms, that it may be navigated with care by ships of moderate size, and furnishes the following directions :—If bound from Linga road to the westward, through Linga strait, steer out to the southward and south-west, till near the north-east part of Sinkep, to give a berth to the islets off Tanjong Dato, the west point of Linga bay, and the extensive shoal which stretches from thence to the road. Having passed about mid-channel between the islets off Tanjong Dato and those near the southern shore, steer for the south-west point of Linga, and the depths will be 12 and 14 fathoms near the islets and rocks on the south side the strait, and 9 or 10 fathoms towards the Linga shore; the bottom hard in the eastern part of the strait, and soft to the westward. Having passed the south-west point of Linga, steer about West, in soundings of 11 to 9 and 8 fathoms, soft ground, and passing to the northward of Wright island, about 2 miles distant, in 7, 8, or 9 fathoms, steer to the north-westward for the strait of Durian.

Ponoebo Strait, between Sinkep and Ponoebo islands, is, like Lima strait, very narrow and encumbered with islets and dangers. We have no directions for it; but, judging from the chart, it appears that it may be entered from the eastward between the small islets Serang, Tenga, and Kekker, and a mid-channel course followed through its narrowest part. After passing the narrows, keep within three-quarters of a mile of Ponoebo, to avoid an extensive shoal, with only 2 fathoms water over it, nearly in mid-channel at the western end of the strait. The soundings in the narrow part of the channel are 15 to 20 fathoms, but at the western end there are not more than 4 or 5 fathoms between the shoal and Ponoebo, and only $3\frac{1}{2}$ to 5 fathoms between the shoal and Sinkep, on which side, also, it appears a vessel of moderate draught may safely pass.

PULO SETJAWA lies close to the north-west extreme of Linga, from which it is separated by a channel about half a mile broad. Upon the chart it is shown as a long narrow island, 14 or 15 miles long, and 3 miles broad, with hillocks on it from 200 to 300 feet high; but this island, together with many others near it, are very imperfectly known, not having been even roughly surveyed.

* Naut. Mag., 1847.

TIAMPA ISLAND, separated from the western side of Setjawa by a channel about $1\frac{1}{2}$ miles wide, with depths from 9 to 14 fathoms in it, is about 5 miles long N.W. and S.E., and about $1\frac{1}{2}$ miles broad. Some rocks appear on the chart close off its south-east point, and along its western shore.

BOEOVA ISLAND lies nearly 3 miles westward, of the north-west point of Tiampa, and in the channel separating them is a group of islets and rocks. Boeova is only 2 miles in extent, but it is a remarkable island, rising to a peak 888 feet high.

Dian is the easternmost, and Lobam the westernmost of a chain of islets fronting the south and south-west sides of Boeova, from which they are separated by a channel with depths of 12 fathoms in it, but there is a rock near the west point of Boeova.

The Leda rock is the outermost of a ridge of rocks which extend about $1\frac{1}{2}$ miles in a N.W. by W. direction from Lobam.

TEMIANG, DEDAP, ABANG, and POTONG ISLANDS.—To the northward of Boeova island, the eastern side of the Inner route is bounded by numerous islands, with deep channels between them.

Temiang, the first of these islands, has some table land 800 feet high near its west end; close off the north-west end is Pintoe, an island about a mile and a third long; and off the north-west end of Pintoe, is an islet named Kebat.

Dedap and Pangelap islands lie close together, in a northerly direction, distant 5 or 6 miles from Pintoe.

Little Abang lies about 2 miles N.W. by N. from Pulo Dedap; islets and rocks extend about a mile from its east side. Between Dedap and Little Abang is Abang strait, narrowed to the breadth of a mile by three islets which extend about three-quarters of a mile from the north-western extreme of Dedap, and also by the two Sepientoe small islets surrounded by rocks, the outer edge of which are about a mile from the southern end of Little Abang; in the channel between these islets are depths of 14 to 18 fathoms.

About a mile N.N.W. of Little Abang is Great Abang, and between them is a channel with 7 to 13 fathoms water, but it is very narrow, being contracted by some islets near Great Abang, and some reefs extending from both islands. Close to the west side of Great Abang is Tortel islet; and about $1\frac{1}{2}$ miles West of this islet is Hippomenes rock.

Potong island, lying 6 miles W.N.W. from Great Abang, has a hill on it 462 feet high; the island is surrounded by numerous islets and rocks, which off its south-west point extend to nearly a mile.

Three miles West of Potong are two small islets, named Anak Potong,

the same height as Potong, with the Gull rock above water, about a mile W.N.W. of them.

POMPONG ISLAND.—The following islands and dangers lie to the westward of those just mentioned, and although far to the eastward of the proper track for vessels bound through Durian strait, it may be advisable to describe them more specifically.

Pompong is a small island about three-quarters of a mile in diameter, and 461 feet high, lying 3 miles westward of the north part of Pintoe (page 218). In the channel between the islands are several small islets, named Babie islands.

A Rock awash was seen from the Dutch war brig *Egmond*, with the middle of Pompong bearing E. by S. $\frac{3}{4}$ S., the centre of Pompon shoal N.N.E., and Potong island N.W. $\frac{3}{4}$ N.

POMPON SHOAL appears to be two rocks above water surrounded by a reef, with a rock awash about a quarter of a mile westward of the reef. Pompong island bears from it about S. $\frac{3}{4}$ W. $2\frac{1}{2}$ miles.

IRENE ROCK is dangerous, as it lies well out towards the track of vessels. Pompong bears from it E. by S. $\frac{1}{2}$ S. 7 miles; and Potong N. by W. $\frac{1}{2}$ W., 13 miles. Boeava island, if not brought to the southward of S.E. by S. will lead well to the westward of the rock.

CAMELION ROCK lies about 7 miles northward of Irene rock, with the summit of Potong bearing N.N.W. $6\frac{1}{2}$ miles, and the south extreme of Little Abang E. $\frac{1}{2}$ N. nearly 7 miles. Potong, if not brought to the westward of North, will lead well clear to the westward of both the Irene and Camelion rocks.

PASSAGE by ABANG and DUMPO STRAITS.—It should be mentioned here that, in order to avoid the difficulty and delay sometimes experienced in getting from the northern part of Durian strait to Singapore road, many sailing vessels have preferred to pass from the Inner route by Abang strait or Dumpo strait into Rhio strait. It seems probable that the best passages might be made in this way, for the great depth of water in the western part of Singapore strait is often embarrassing in light winds. H.M.S. *Saracen* made a good passage by the Abang strait route, first experiencing all the advantages of the smooth water and less unfavourable tides of the passage inside Linga by Varella strait, and then passing without the least difficulty through Abang strait into Rhio strait.

THREE BROTHERS.—The South Brother, in lat. $0^{\circ} 32' 20''$ N., long. $103^{\circ} 47\frac{3}{4}'$ E., is the largest and highest of the three islands lying at the south entrance of Durian strait. It is about a mile in length, North and South, and not quite half a mile in breadth; the highest hill near the

centre of the island is 257 feet high, and may be seen 17 or 18 miles. There is a white cliff or rock on the north-east side, which makes this island remarkable.*

The Middle Brother, only 135 feet high, lies about $1\frac{1}{4}$ miles northward from the north point of the South Brother.

Between the South and Middle Brother there is a safe passage, about two-thirds of a mile wide, with soundings from 9 to 13 fathoms. Both these islands may be approached to a prudent distance all around, except at the south point of the South Brother, where rocks project considerably.

The North Brother sometimes called the Round Brother, is smaller and lower than the others, being but 87 feet high. It lies N. by W. $\frac{1}{2}$ W. $2\frac{1}{2}$ miles from the Middle Brother, and between them there is a safe passage, with 11 to 17 fathoms water, now frequently used; but ships passing through should keep pretty close to the Middle Brother, to avoid a rock appearing above water, at the extremity of a reef of straggling rocks that projects nearly a mile S.S.E. from the North Brother, and which is partly dry at low water; but there are gaps of deep water between the rocks in some parts.

EASTERN BANK, which bounds the channel to the eastward of the Brothers, is composed of hard sand, having irregular depths on it from 1 to 6 fathoms, with 10 and 12 fathoms close to its western edge. From the North Brother, its south extreme bears East-southerly, about 5 miles, and from thence its western edge extends about N. by W. $\frac{1}{2}$ W. $3\frac{3}{4}$ miles, rounding afterwards to the north and north-east.

LOW MANGROVE ISLANDS.—A number of low mangrove islands extend from about $2\frac{1}{2}$ miles northward of the Sumatra coast, to a distance of 8 or 9 miles in that direction from it. The south-easternmost of the group is a very small islet, known as South island, 90 feet high and surrounded by rocks. The north-easternmost one, named Long island, which lies about 6 miles westward of the South and Middle Brothers, is $1\frac{1}{2}$ miles long, north and south; and $1\frac{1}{4}$ miles north-westward of it is a higher island, named Saddle.

SHOAL PATCHES.—A patch having only 2 fathoms water over it lies with the northern extreme of Long island bearing W. $\frac{1}{2}$ S., Saddle island W. $\frac{3}{4}$ N., and the peak of False Durian N.N.W. $\frac{1}{4}$ W. Three-quarters of a mile to the southward of this patch are $3\frac{1}{2}$ fathoms, and 4 or 5 fathoms at a short distance from its eastern side.

About a mile north-eastward of the 2-fathoms patch is another with 3 fathoms water over it, and 4 and 5 fathoms around it, discovered in

* See Chart of Strait of Singapore, Sheet 1, No. 2402.

1861 by Mr. Stanton, commanding H.M.S. *Saracen*. It is about a third of a mile in extent, composed of sand and shells, and lies three-quarters of a mile South from Rocky islet off the eastern extreme of False Durian. Near the centre of the patch the high peak of Great Durian is just open eastward of Rocky islet, and False Durian peak bears N.W. $\frac{1}{2}$ W. Vessels from the southward after passing the South Brother should give the south side of False Durian a berth of 4 miles, as other shoals extend nearly this distance on the above bearing.

All these dangers will be avoided by keeping South Passage island, or the west end of Little Durian, open eastward of the Rocky islet lying off the eastern extreme of False Durian; or by not bringing the latter to the northward of N.N.W. until nearly abreast of it, when it may be approached to 2 cables' lengths.

At $3\frac{1}{2}$ miles South of Rocky islet is a patch of $4\frac{1}{2}$ fathoms, with 6 to 8 fathoms around it; and a mile South of it is another of 5 fathoms, with 6 fathoms around it. Half a mile S.S.W. of this last is the 5-fathoms edge of the bank extending from the Sumatra coast.

The edge of the Sumatra bank and the whole of these patches may be avoided by not bringing the peak of Great Durian to the northward of N. $\frac{3}{4}$ W., and it would seem advisable for large ships not to stand far to the westward of that line, for from the patchy character of the ground it may be probable that other shoaler spots may exist than are at present known of.

FALSE DURIAN, or Pulo Duri, is a very irregular shaped island about $2\frac{1}{2}$ miles in extent, and with the contiguous islands, forms the south-western limit of Durian strait. Near its north-west end is a peak 604 feet high, which bears West distant 5 miles from the North Brother.

Three or four small islands lie close to the south-east point of False Durian, the outermost one of which, named Rocky islet, is very small. A group of islets and rocks, called Rocky islands, lie off the north-west point.

Horsburgh observes that,—“As the islands hereabout have a similar appearance, strangers when coming from the southward ought to be careful not to mistake one for the other, for some ships have not been able to discern the proper passage. The peak of Great Durian being higher than the peak of False Durian, or indeed of any other land, is first discerned in coming from the southward.”

RICHARDSON SHOAL.—This dangerous coral rock, on which the ship *Hurry Puddemsey*, Captain Richardson, struck in May 1863, has lately been examined by H.M. Surveying vessel *Rifleman*. It is about 200 yards in extent, has $2\frac{3}{4}$ fathoms on it, and 7 to 10 fathoms around it, and between it and the east side of False Durian island, at low water springs.

From the rock the peak of False Durian bears W. by N., distant $2\frac{1}{2}$ miles; Rocky islet S. $\frac{3}{4}$ E. $\frac{1}{2}$ three-quarters of a mile; North Brother E. $\frac{3}{4}$ N. $2\frac{1}{2}$ miles; and Middle Brother S.E. by E. 4 miles.

To avoid this rock, do not bring Rocky islet south of S. by W., until the peak of False Durian bears West.

A **BANK** having $4\frac{1}{2}$ and 5 fathoms water over it, about a mile long N.W. and S.E., lies a mile north-westward of False Durian.

GREAT DURIAN, or Pulo Sanglar, about 4 miles N.N.W. of the North Brother, is a larger island than False Durian, being $3\frac{3}{4}$ miles in extent, with a peak near its centre 965 feet high. This peak, as remarked above, is the highest land hereabouts, and is consequently visible at the greatest distance.

THE TOMBS is the name given to some islets and reefs, extending about three-quarters of a mile from the southern part of Great Durian.

A small reef of coral lies about half a mile south-westward of the Tombs, and about a mile S.E. by S. from the south-west point of Great Durian. Between this reef and the Tombs are 12 fathoms water, and from 15 to 27 fathoms at a short distance from both dangers. Great Durian peak bearing North, and False Durian peak bearing S.W. $\frac{1}{2}$ W., will lead about half a mile clear of the western and southern sides of both dangers.

LITTLE DURIAN, 590 feet high and about half the size of Great Durian, lies off the north-west extreme of the latter island, from which it is separated by a channel only a quarter of a mile wide. Some rocks lie close to its south-west shore, and off its north-west point is a small islet with a rock outside of it.

SOUTH PASSAGE ISLAND, 204 feet high, and about half a mile in extent, north and south, lies three-quarters of a mile from the south-west coast of Little Durian. It is surrounded by rocks lying close to the shore.

NORTH PASSAGE ISLAND, 156 feet high, is about half the size of South Passage island, from which it bears N.N.W. $\frac{3}{4}$ W. $2\frac{1}{2}$ miles.

PRINCES ISLAND, lying W. by S. $\frac{3}{4}$ S. $2\frac{1}{2}$ miles from North passage island, on the western side of Durian strait, is a coral formation not much above high water, but having some soil between the rocks. It is covered with trees, and their height being about 100 feet, the island has a round and conspicuous appearance. On the eastern side there is a coral ledge, nearly awash at low water, extending 3 cables' lengths beyond the trees, and E.S.E. from the southern extreme of the island.*

SOUTHERN ENTRANCES OF DURIAN STRAIT.—Durian strait may be entered on either side of the Three Brothers. When the peak of Great

* Stanton.

Durian is seen bearing N. by W., a ship will be in the fair track for entering the strait by either channel, and should steer for the South Brother, which in one with Great Durian peak bears N.N.W., nearly.

The channel eastward of the Three Brothers, between them and the Eastern bank, and between the North Brother and the south shore of Great Durian, is about 4 miles wide, having various depths, from 15 to 10 fathoms.

The channel westward of the Brothers, between them and False Durian, is 3 miles wide, and has from 8 to 14 fathoms water, but near the North Brother 24 fathoms. Both channels are equally safe.

The Strait of Sanglar may also be considered one of the southern entrances to Durian strait, although it is but imperfectly surveyed, and does not offer any advantages to induce a vessel to proceed through it, but on the contrary is very inferior to either of the other channels. It lies to the northward of Great and Little Durian, and is bounded on the north by the islands of Jang, Muro, and the group of Monkey islands. The strait is about a mile wide, and divided by two islands, which reduces the width of the navigable channel to the northward of those islands to little more than half a mile.

The depths between the Eastern bank and Great Durian vary from 14 to 9 fathoms. Large vessels should not, however, go nearer to the east coast of Great Durian than 2 miles, on account of a bank which projects more than $1\frac{1}{2}$ miles from that side of the island, with 3 and 4 fathoms water over it, and possibly less in places.

In the eastern part of the strait of Sanglar the soundings are 18 to 12 fathoms, decreasing to 10, 8, and 7 fathoms at its western end. In the fairway of the western end is a patch of 4 fathoms, from which the north-west extreme of Little Durian bears S. by W. distant nearly a mile. The soundings in this strait are very few, and as it is quite possible that shoaler parts than those known of may exist, vessels ought not, therefore, to venture through.

MONKEY ISLANDS, three in number, lie from $1\frac{1}{4}$ to $1\frac{1}{2}$ miles northward of Little Durian. The middle island, which is the largest, is about half a mile in diameter.

Rocks.—Two rocks or patches of reef lie off the north-west point of the westernmost Monkey island. The west extreme of Little Durian, if not brought south of S.S.E., will lead westward of them, and North Passage island kept south of S.W. by S., will lead to the northward. In the channel between these rocks and North Passage island the soundings are 27 and 28 fathoms close to the island and in the fairway, but near the rocks are 18 and 15 fathoms.

MURO ISLAND is long, narrow, but high, and forms the eastern side of the middle part of Durian strait. It extends from about $1\frac{1}{2}$ miles northward of Great Durian in a N.W. by N. direction for $5\frac{1}{2}$ miles, its breadth being about $1\frac{1}{2}$ miles at its south-east, and half a mile at its north-west end. On its east side, between it and Suji island, is the strait of Muro.

The west side of Muro is but imperfectly known, and few soundings have been obtained near it. A reef appears to extend about a quarter of a mile from its north-west point, having 17, 14, and 10 fathoms pretty close to it.

DOLPHIN ISLAND, 153 feet high, lies about a third of a mile off the north-west end of Muro island. It is about a mile in extent, and fronted on its western side by a coral reef projecting about a cable's length from it, near to which the water deepens irregularly from 13 to 20 fathoms.

A rock lies a third of a mile N.N.W. from the north extreme of Dolphin island.

A REEF, of an oval form, 2 cables in extent, steep to all around, and dry at low water springs, lies a mile westward of the southern part of Dolphin island. From the centre of this reef, the south end of Red island bore N. by W. $\frac{3}{4}$ W.; the centre of North Passage island S. $\frac{1}{4}$ W.; the south-west point of Dolphin island was on with a sandy point of Moro island; and Sabon hill bore W. by N. $\frac{1}{4}$ N.

BOLOMBO ISLAND is high, about 3 miles long, N.W. by N. and S.W. by S., and half a mile broad. Its southern end is about a mile E. $\frac{1}{2}$ N. from the north end of Moro, and its north end is about three-quarters of a mile from the Twins. Its north end is fronted by a reef to a distance of nearly half a mile, having a white rock within its margin, off the north-west point of the island.

RED ISLAND, or Pulo Goomeata, lying nearly 2 miles north-west of Dolphin island, is of triangular shape, about half a mile in extent, and covered with trees. Its height is 256 feet, and it may be seen 15 miles.

ROCK AWASH.—The passage between Red island and Dolphin island ought not to be attempted, for nearly in mid-channel lies a dangerous rock, awash at low water spring tides, and the soundings near it being irregular, afford no guide. When upon this rock, the north-east end of Red island was on with the south peak of Great Carimon, and the centre of the Twins bore N. $\frac{3}{4}$ E.

A ROCKY PATCH, dry at low water, lies rather more than half a mile W. by S. from the south-west end of Red island, with deep water all round, and between it and the island. From the centre of the patch, the north-west brow of Red island is on with the south end of the North

Twin, and the east end of South Passage island is very little to the eastward of the peak of False Durian.

ROCKY ISLET.—Nearly half a mile northward of Red island is a small rocky islet with a tree on it, surrounded by rocks dry at low water, between which and Red island the depths are 15 and 16 fathoms water.

The TWINS, or Pulo Mentegas, are two small round islands, lying a little more than a mile north-eastward of Red island. They bear N.N.W. and S.S.E. of each other, and are 152 feet high.

DANGEROUS REEF.—Distant three-quarters of a mile north-westward of the north Twin is the north end of a dangerous and extensive coral reef, dry at low water spring tides, having from 10 to 17 fathoms all round. When upon it, North Passage island bore South, the north-west end of Dolphin island (a rocky point) was a little to the westward of the peak of Great Durian, and the east end of Red island bore S. by W.

The WESTERN SHORE of DURIAN STRAIT, from False Durian to the Carimons, is formed of numerous low islands, covered with trees, the principal of which is Sabon. This land is generally known as the Sabon shore, for the islands forming it are separated from Sabon and from each other only by very narrow channels, and therefore appear as one continuous island.

Islands between False Durian and Sabon Island.—Pulo Panjang, a large low flat island, lies northward of Saddle, and westward of False Durian; off its north coast is a small islet named Round island.

Pulo Terreatep, the next island named on the chart, is the largest and easternmost of a group of several islands, and bears N.W. by W. $\frac{3}{4}$ W. 5 miles from the north-west point of False Durian; about a third of a mile from its east side is a patch with 4 fathoms water on it.

Two miles N.N.W. $\frac{1}{2}$ W. from Terreatep, is what appears to be rather a conspicuous island, for it is delineated upon the chart as having two hills upon it, whereas, all the adjacent land, and also Princes island, about a mile to the north-eastward, appears low. This island is distant about $1\frac{1}{2}$ miles from the nearest point of Sabon, a round island lying between them.

The channel between the island just mentioned and Princes island, has not been sounded. No vessel should venture through it, for reefs are known to extend a long distance from Princes island, and other dangers may very possibly exist.

We do not know of any danger off the eastern shores of these islands, and there appears to be rather regular soundings of 9, 8, and 7 fathoms pretty close to them. The $4\frac{1}{2}$ -fathoms bank north-westward of False Durian has been referred to at page 222.

SABON ISLAND, or Pulo Pappan, is the largest island on the western shore of Durian strait. Its north point reaches to within 8 miles of the southern part of the Great Carimon, and off its north-east coast lie the islands of Buru, Paril, and Pandan.

Deep-water point, the most eastern point of Sabon, lies $2\frac{3}{4}$ miles N.W. from Princes island. There is another point $2\frac{1}{2}$ miles westward of Princes island, the coast between forming a bay, fronting which is a reef with some trees upon it, from the outer part of which Deep Water point bears N.N.W. $\frac{1}{2}$ W., distant three-quarters of a mile. To avoid this danger be careful to keep the peak of False Durian open eastward of Princes island.

From Deep-water point the Sabon coast trends N.W. by W., and lying close off it are four islands, the north-westernmost of which is the largest.

MIDDLEBURGH SHOAL, lying nearly mid-way between Red island and the bank extending from Sabon island, is a reef of coral rocks, 300 yards in extent, of circular form, partly dry, about one foot above the sea at low water spring tides,* its sides being almost perpendicular, with 7 and 9 fathoms close to the rocks, and 17 to 20 fathoms about 200 yards off. When on the centre of the shoal, the Passage islands were in one, their east extremes bearing S.E. by S.; the rocky islet, with a tree on it, off the north end of Red island, nearly on with the north brow of the North Twin; the Twins open to the northward of Red island; the south end of Red island, E. by N. $\frac{1}{4}$ N.; Sabon hill, W. by N. $\frac{1}{2}$ N.; Clay island, W. $\frac{1}{2}$ N.; peak of Great Durian, S.E. $\frac{1}{4}$ E., and the peak of False Durian, S.S.E. $\frac{1}{2}$ E.

Passage eastward of Middleburgh Shoal.—The passage between Middleburgh shoal and the rocky patch off the west end of Red island, is 2 miles broad, with irregular soundings from 16 to 22 fathoms. With a fair wind the best leading mark is to keep the east end of North Passage island on with the peak of False Durian, and stand no nearer Middleburgh shoal than to bring the east end of North Passage island on with the west end of South Passage island, nor nearer to Red island than one mile, when the west end of South Passage island will be on with the peak of False Durian, and the depth will be 25 or 27 fathoms.

Passage westward of Middleburgh Shoal.—The passage between Middleburgh shoal and the bank extending from the Sabon shore is about $1\frac{1}{2}$ miles wide, with soundings deepening from 6 or 7 fathoms near the bank to 14 and 16 and 20 fathoms near the shoal. Deep-water point kept between the bearings of S. $\frac{1}{4}$ W. and S. $\frac{1}{4}$ E., will keep a ship clear of the Middleburgh shoal on one side of the passage, and the bank on the other.

* Horsburgh.

PULO BURU is a low island $4\frac{1}{2}$ miles in length N.N.W. and S.S.E., crowned with high trees, and having a few inhabitants, who collect great quantities of mangosteins, durians, and other fruits, which flourish here in a wild and luxuriant state. It is the next largest island to Sabon, and its south-east part bears N.N.W. nearly 5 miles from Deep-water point. Off its south end is a small islet, named Clay island, covered with straggling trees and surrounded by rocks.

The eastern shore of Pulo Buru is fronted by a shoal-water bank to a distance of from 1 to $1\frac{1}{2}$ miles, and rocks partly dry at half tide nearly to the same distance, with Sabon hill, or Gunong Pappan bearing from W. $\frac{1}{2}$ N. to West. These dangers may be avoided by keeping Deep-water point south of S. $\frac{3}{4}$ E.

Horsburgh remarks that Sabon hill cannot be easily mistaken, being the only hill on the western side of the channel to the southward of Great Carimon, which island has on it *two* high peaks or hills, and the Little Carimon *one*.*

PULO PANDAN and PULO PARIL.—Pulo Pandan, the southern of two small islands lying about a mile northward of Pulo Buru, is low, and covered with trees about 100 feet high. Pulo Paril is a much larger island than Pandan, lying to the westward of it, and close to the northern part of Sabon.

BANK.—Close to the eastward of Deep-water point the depth is 9 fathoms, and 5 fathoms close to the northern extreme of the point; but from thence a shallow bank extends, with a slight curve into the bight between Deep-water point and Pulo Buru, as far as Pulo Pandan. Abreast of Pulo Buru the bank presents a very irregular outline, with, as before stated, patches of rock upon it, projecting in some places from 1 to $1\frac{1}{2}$ miles from that island.

Deep-water point bearing S. $\frac{3}{4}$ E., will lead a mile clear of the edge of this bank in $4\frac{1}{2}$ or 5 fathoms, abreast of the bight between Deep-water point and Pulo Buru, and will also lead nearly half a mile outside the elbow or easternmost part of the bank off Pulo Buru.

GREAT CARIMON ISLAND is 10 or 11 miles in length in a N.N.W. direction, and near its north end are two high peaked hills, the northern one 1,876 feet, and the southern one 1,474 feet high; the rest of the island consists of low level land. Its southern part is separated from Sabon island by the strait of Clam, $2\frac{1}{2}$ miles wide. Near its west side are several low islands of various sizes, and its east side is fronted

* The Little Carimon has two high peaks on it, but they probably appear as one from the southward, being nearly of the same height.

by a shoal mud bank ; but the north-east point has from 6 to 8 fathoms water very near it, about a mile from the islet that lies in the passage between it and the south end of Little Carimon.

LITTLE CARIMON, separated from the north-east part of Great Carimon by a channel half a mile wide, is a high bold island, $2\frac{1}{2}$ miles in length N.W. and S.E., and rising to two peaks, covered with trees, the northern one being 1,067 feet, and the southern one 1,026 feet high.*

The **BROTHERS** are round islets, the two outermost of which lie near each other about $2\frac{1}{2}$ miles north-westward of Little Carimon ; the other, of similar appearance, is within a mile of that island, and is not so soon discerned as the two outer ones. About 2 miles to the southward of the Brothers there is a White rock above water, not far off the north end of Great Carimon, and entirely out of the track of ships.

SAND-BANKS.—A patch of 5 fathoms lies E. $\frac{1}{2}$ S. $1\frac{1}{4}$ miles from Pulo Pandan ; and there are two other patches of 4 fathoms off the same island, one bearing E. by N. nearly 2 miles, and the other about N.E. $\frac{1}{2}$ N. the same distance from it. These patches seem to be the tail of a bank of sand lying about 2 miles off the south-east coast of Great Carimon, and which nearly joins another bank extending south-east from the Little Carimon. These banks are thus described by Horsburgh :—

“The bank of sand off the east end of Great Carimon extends N.W. by N. about 4 miles, with 4 fathoms on it in most places, and $2\frac{3}{4}$ on the western part ; between which and the shore there are $5\frac{1}{2}$ and 6 fathoms. About 2 miles S.E. from the south-east point of Little Carimon there are $3\frac{3}{4}$ fathoms on another bank, which stretches in a south-easterly direction, nearly joining to the former bank ; and the general depths on it are from 4 to 5 fathoms.”

Pulo Pandan bearing South will lead to the eastward of the $2\frac{3}{4}$ fathoms patch on the southern bank ; and the peaks of Little Carimon in line about N.W. will lead close to the edge of the northern bank in 5 or $4\frac{3}{4}$ fathoms.

TIDES.—Throughout Varella and Durian straits the tides are very irregular, rendering it difficult to ascertain either their direction or velocity. In August and September the rise and fall was found generally to be between 10 and 11 feet, sometimes running from 3 to 4 knots per hour during the springs, at other times not more than $2\frac{1}{2}$ knots at the same period. This irregularity appears to be produced by the prevailing winds in the north or south entrance of the straits, forcing the tides through in one direction for 12 or 18 hours at a time, although the rise and fall on the shore was regular. But sometimes the tides run with regularity.

* See Chart ; Strait of Malacca, Sheet II., No. 1,355 ; scale, $m = 0.7$ of an inch.

At Red island, in the northern part of Durian strait, it is high water, full and change, at 10h.,* and the tide rises 10 or 11 feet.

Ripplings.—The ripplings might be alarming to a stranger; they appear to be caused by the uneven bottom, and the resistance the tides meet with from the steep reefs and numerous small islands.

The **STRAITS of SABON and MANDOL** are very intricate, and are never attempted by European navigators. The former is contiguous to the western sides of False Durian, Sabon, and the Great Carimon; that of Mandol is along the Sumatra coast, having part of this coast, the islands Mandol and Pantjoor, and the entrance of Brewers strait on the western side, and several islets and reefs on the eastern side, which separate it from Sabon strait. As both these straits are bordered by reefs, with shoal water in some places, they appear to be only navigable by proas or small vessels.

BREWERS STRAIT, or Salat Panjang, is a narrow arm of the sea, which extends from the above straits to the westward, and joining the Siak river, falls into Malacca strait nearly opposite the town of that name. The coast of Sumatra, to the westward of the Carimons, is thus formed of several islands. Although Brewers strait is narrow, there is good depth of water in it: but it is only navigated by the country proas.

PHILLIPS CHANNEL, or the North-eastern entrance to Durian strait, is formed between the numerous islands fronting Battam and Boelang islands to the south-eastward, and Long and Round islands to the north-westward. It appears to be free from danger, with good anchorage, and is a short route for vessels proceeding to or from Singapore.

SUGI, JOMBOL, BOELANG, and BATTAM, are four islands lying to the north-eastward of Muro and Bolombo Islands (page 224). The two former are about 10 miles long in a N.W. and opposite direction; the two latter are much larger, Boelang being about 15 miles long, in the same direction, and 7 miles broad, and Battam 15 or 16 miles in an east and west direction, and 13 or 14 miles north and south. The northern parts of Boelang and Battam form part of the southern side of Singapore strait.

Numerous small islands, islets, and rocks lie off the shores of and in the channels between the above-named large islands, the whole of which are known under the general name of the Boelang archipelago, but in the present state of our knowledge no vessel should venture among them, and it is, therefore, only the outermost islands and dangers which concern the ordinary navigator, and those will be next described, after the following brief observations on the channels between the large islands.

* Horsburgh.

MURO, SUJI, JOMBOL and BATU HADJI STRAITS are the names of the channels separating the large islands just described. Muro strait is bounded on the west by Great Durian, Muro and Bolombo islands, and on the east by the Eastern bank and Suji island. There are many islands and rocks in it, and it has been but imperfectly surveyed. It is however navigable with proper care, and in 1860 an electric telegraph cable between Singapore and Batavia was laid through it from a large steamer piloted by a Dutch steam frigate.

Suji strait, between Suji and Jombol, is very imperfectly known, but it is certainly encumbered at both ends with many dangers.

Jombol strait, between Jombol and Boelang, is also encumbered with many dangers, although apparently not to so great an extent as Suji; it is but imperfectly known, and at present, like the rest of the straits, is not available for general navigation.

Batu Hadji strait, between Boelang and Battam, is very narrow, in some places not a quarter of a mile broad. A running survey was made of this strait several years ago by Mr. L. C. Bailey, Master R.N., and it is said to be available for vessels, but we cannot give any directions for it. A short time since it was urged upon the attention of nautical men at Singapore as being a route by which vessels could be speedily towed from Singapore roads to sea in the N.E. monsoon; but it will have to be properly surveyed before it can be used for such a purpose.

PULO DONCAN, lying N.E. $\frac{3}{4}$ N., distant $6\frac{1}{2}$ miles from the Twins (page 225), is the larger of two low wooded islands, fronting the north entrance of the strait of Jombol, which is formed by a group of beautiful islands, some of which are inhabited. Pulo Doncan is surrounded by reefs, and ought not to be approached nearer than a mile.

CAP ISLAND, so named from its appearance, bearing N. $\frac{1}{4}$ W. 4 miles from Pulo Doncan, is a rock about 40 feet in height, with a flat top and perpendicular sides, surrounded by a reef to the distance of about 300 yards, near to which the depths are 10 and 11 fathoms, with 14 fathoms a little farther out.

CAUTION.—It would be imprudent to pass to the eastward of Cap island, between it and Steep Cape, as a reef of rocks lies one mile off Steep Cape, and it is quite possible that others may exist, for the chart has very few soundings in this locality.

ROUND ISLAND, or Takong Ketchil, is a small but elevated islet, lying $3\frac{1}{2}$ miles northward of Cap island, $3\frac{1}{2}$ miles W. by S. $\frac{3}{4}$ S. from Helen Mars reef, and $3\frac{1}{2}$ miles S.S.W.-southerly from Raffles lighthouse. It is the south-easternmost of a chain of islands and reefs which extend from

it in a north-westerly direction for about $5\frac{1}{2}$ miles. The island is surrounded by reefs, projecting from it in places to the distance of half a mile.

LONG ISLAND, or Takong Besar, 115 feet high, and lying nearly half a mile N.N.W. of Round island, is similarly surrounded by reefs, and a small islet lies close to its north shore. Long island and Round island are also known as the Brothers : both are covered with trees.

Between Long island and Round island reefs is a narrow channel, close to the south end of the former, with 8 to 14 fathoms water in it.

RED ISLAND, or Pulo Patampong, is a mere islet or rock, 20 feet high, covered with green trees, with a beach of red sand, lying two-thirds of a mile to the north-west of Long island. The reef which surrounds this island, extends from it only a short distance on the east side, but projects more than half a mile on the west side.

Between the south-east side of Red island and the reef extending from Long island, is a channel about a third of a mile broad, with 8 to 17 fathoms water in it.

REEFS.—Three detached reefs lie in a south-westerly direction from Red island, the outer and largest one being distant nearly $1\frac{1}{2}$ miles from it. Raffles lighthouse on Coney island, in line with the north-west extreme of Long island, leads to the eastward of them ; Round island bearing E. by N. leads to the southward ; and the northern Tree island, open westward of the southern one, bearing N.N.W., leads to the westward.

TREE ISLANDS, or Pulo Angup, are the outermost of the islands and dangers which extend north-westward from Round island, and limit the southern side of the western entrance of Singapore strait. They are two small islets, or rather clumps of trees, lying N.W. and S.E. of each other, about half a mile apart, on a bank of rocks and sand, very little elevated above the sea at high water. The southern edge of the bank bears W. by N. $\frac{1}{2}$ N., distant $2\frac{2}{3}$ miles from Red island, and from its north-western edge, which is awash at high water, Raffles lighthouse bears E. $\frac{1}{3}$ N., nearly $5\frac{1}{2}$ miles. The reef extends about a third of a mile northward of the north-west islet, and half a mile north-westward of it ; close to are 8 or 9 fathoms.

In passing northward of Tree island, the Raffles lighthouse (or light), should not be brought to the northward of East, nor the reef neared under a depth of 14 fathoms, which will keep a vessel half a mile northward of its northern edge.

KENT ROCKS lie between Red island and Tree island reef, N.W. $\frac{3}{4}$ N. and S.E. $\frac{3}{4}$ S. from each other, and not quite half a mile apart. From the southern rock, which is the larger of the two, and has $1\frac{1}{2}$ fathoms over it at low water springs, the north end of Long island is on with the

centre of Red island, S.E. by E., and Raffles lighthouse bears E. by N. $\frac{3}{4}$ N. From the northern rock, which is about 30 or 40 feet in circuit, with not more than 3 feet water on it, the southern Tree island bears W. $\frac{3}{4}$ S.,* distant a mile, and Raffles lighthouse E. by N. $\frac{1}{4}$ N., 4 miles. The depths close to these rocks are 7 to 10 fathoms, deepening quickly to 15 and 20 fathoms.

The channel between the south-east rock and the reef surrounding Red island is $1\frac{1}{4}$ miles wide, with depths of 11 to 17 fathoms; that between the northern rock and Tree island reef is three-quarters of a mile wide, with depths of 12 to 20 fathoms. These rocks, however, render the passage between Red island and Tree island unsafe, and it ought not to be attempted.

The positions of these rocks may easily be perceived when the tides run strong, by the strong ripples over them; observing that the danger lies in the smooth part, close to the break of the rippling. Small fishing boats may be often seen upon them.

HELEN MARS REEF is the outermost of some dangerous reefs which, together with several small islets, lie off the north-west point of Boelang. From this reef Round island bears W. by S. $\frac{3}{4}$ S., distant $3\frac{3}{4}$ miles, and Raffles lighthouse is just inside the left extremes of Barn and Alligator islands N.W. $\frac{1}{4}$ W., nearly. A short distance from it are 14 and 15 fathoms.

The north peak of Great Carimon in line with Red island leads close to the northward of this dangerous shoal; Red island, bearing W. $\frac{3}{4}$ S., will lead well clear to the northward; and Steep Cape, the bold headland inside Cap island, if kept to the southward of S. $\frac{1}{2}$ W., will lead to the westward.

JUNCTION of PHILLIPS CHANNEL and SINGAPORE STRAIT.—

The Helen Mars reef lies at the point where Phillips channel joins the main channel of Singapore strait, which at this part is bounded on the north side by Coney island, on which stands Raffles lighthouse, and the islands adjacent to it, and on the south side by the Helen Mars and adjacent reefs and islands, Long island, Red island, Kent rocks, and Tree islands with its surrounding reef.

The description of the Rabbit and Coney, with Raffles lighthouse, and the western part of Singapore strait, is given in page 292.

DIRECTIONS from BANKA STRAIT through VARELLA and DURIAN STRAITS to SINGAPORE.†—Departing from Banka strait, and

* This bearing is taken from the Chart of Singapore strait, Sheet II. Horsburgh gives W. $\frac{3}{4}$ N.

† Mostly from Horsburgh.

being abreast of Batakarang point in 7 fathoms, if bound to Varella strait, a N.N.W. course will lead towards Varella or Brahalla island, distant about 78 miles. The bank along the Sumatra coast in this space being very flat, the soundings are usually the best guide, and the rule is to keep in from $5\frac{1}{2}$ to 7 fathoms. In working, the coast may be approached with proper care to 5 fathoms. Recollect, however, that at 9 miles S.E. by E. from Tanjong Jaboeng, the bank projects a sort of spit or horn, having only 4 fathoms water over it, and 6 fathoms between its northern part and the shore.

The tides near the shore are generally strong; in the offing they are irregular, and currents sometimes prevail.

In passing through the south channel, between Varella island and Tanjong Jaboeng, keep in 10 or 12 fathoms towards Varella to give a berth to the bank of hard ground projecting from Tanjong Jaboeng; from thence in working along the coast to the westward, which is steep-to, it may be approached occasionally, with care, to 8 or 7 fathoms.

Standing towards Varella, remember the shoal with only 2 fathoms water over it, reported to lie E.S.E., 3 miles from that island (page 212). Being through the narrow part of the passage between Tanjong Jaboeng and Varella, which is about $6\frac{1}{2}$ miles wide, a N.W. by W. course should be steered towards the Alang Tiga islands, keeping along the coast in soundings of 9 to 12 fathoms. With a working wind, the Sumatra coast may be approached to 6 or 7 fathoms. When steering towards the Alang Tiga, the southernmost island must not be brought more westerly than N.W. by N. until Seera or Reef island is south of E. by S. $\frac{1}{2}$ S., to avoid the Speke rock (page 214).

In this track attention to the tides is *indispensable*, for they are often irregular, sometimes setting out of the Jambie river to the north-eastward $2\frac{1}{2}$ or 3 miles per hour; and the coast bank to the distance of 14 or 15 miles westward of Tanjong Jaboeng, is nearly dry at low spring tides, in some places 4 or 5 miles from the shore.

Between the Alang Tiga islands and Basso island the soundings vary from 7 or 8 fathoms near the Alang Tiga, to 13 and 14 near the edge of the bank which projects from Basso; deepening to 15, 16, and even 18 fathoms 2 miles eastward of Dato point.

Having passed the Alang Tiga at about 2 miles, a course about N. by W. should be steered for the southernmost of the Three Brothers, bearing from the Alang Tiga N. by W. $\frac{1}{2}$ W. distant 63 miles. In working, be careful not to stand nearer to Basso island or Dato point than 2 miles, and also avoid being tempted to stretch into Amphitrite bay, for the banks off the former, and the shoals in the latter,

are steep-to, and the lead cannot be depended upon to give warning in sufficient time, at all events not near Basso island or Dato point; with great care it may do so, apparently, in Amphitrite bay. At 6 or 7 miles northward of Dato point the soundings decrease more regularly towards the bank, which may from thence be approached by the lead into 9 and 8, and into 7 fathoms towards the low Mangrove islands. In standing to the eastward take care not to deepen above 18 or 19 fathoms, particularly as the distance from the Alang Tiga islands is increased, for the ground on that side is foul, and improper for anchorage.

Marks for keeping clear of the Irene rocks and other dangers on the eastern side of the channel have been given in page 219, and the navigator is referred to them if he should stand so far over to the eastward, which is, however, out of the fair track.

To enter Durian strait by the eastern channel, a berth of 1 or 2 miles may be given to the South and Middle Brothers, by passing them in 10 or 12 fathoms, and on nearing the North Brother, give a prudent berth to the reef that projects from it to the south-eastward, taking care also not to stand too far over towards the Eastern bank. This bank will not be approached too close, if the beach on the Middle Brother be kept well in sight from the deck; or in working, if the vessel gets on the edge of the overfalls in making the eastern board, tack immediately, and stand towards the Brothers, to 10 or 11 fathoms. When the southern point of Great Durian is approached, the three islets near it, called the Tombs, will be discerned, and Sabon hill, bearing about W. by N. $\frac{1}{4}$ N., making like two islands, which may be mistaken for the Carimons. Having passed the North Brother, at $1\frac{1}{2}$ or 2 miles' distance, haul to the westward, giving a berth of about $1\frac{1}{2}$ miles to the southern part of Durian, to avoid the sunken rocks rather more than half a mile south-westward of the Tombs.

To enter Durian strait by the western channel, when near the South Brother, steer to the westward of it at $1\frac{1}{2}$ miles' distance, and proceed to the northward in 8 to 12 or 14 fathoms, about mid-channel between the other Brothers and the eastern part of False Durian, to avoid the foul ground surrounding the Brothers, and the shoal patches which lie to the southward of the Rocky islet contiguous to the east end of False Durian (see page 221).

Take care, however, when standing towards False Durian, not to bring Rocky islet to the southward of S. by W. until the peak of False Durian bears West, to avoid Richardson rock.

Having cleared the Brothers by either of the channels, the Passage islands will be seen to the north-westward on the east side of the channel; and on the west side, opposite North Passage island, is a flat island called

Princes. There is a channel between the Passage islands and Little Durian, but it is not frequented, as it is not so convenient as the former; but in a case of necessity a ship may sail between any of these islands, giving them a berth of one mile, as off their points there is generally rocky and foul ground.

After leaving the Brothers, steer for the Passage islands; in mid-channel the depths will be generally from 17 to 26 fathoms. When they are approached, Red island, about 6 miles N. $\frac{1}{2}$ W. from North Passage island, will be discerned; it may be known by two islets to the north-eastward of it, called the Twins. With care, the passage is safe in daylight, between Middleburgh shoal and Red island; but as a reef, dry at low water, lies W. by S. more than half a mile from the latter, and the depths being from 17 to 26 fathoms, with some overfalls, the channel to the westward is preferable.

There is a narrow passage, with 15 fathoms water, between Red island and the reef just mentioned, through which the country ship *Warren Hastings* passed in 1789, but it ought not to be followed.

There is also a passage close to the eastward of Red island; but as its eastern side is bounded by the rocks lying about a mile north-west of the Twins, and by others about three-quarters of a mile E.S.E. of Red island, it ought not to be attempted by a stranger.

The channel eastward of Middleburgh shoal, between it and the reef lying W. by S. from Red island requires care; the best track is about mid-channel in 19 to 16 fathoms, mud. When Middleburgh shoal is conspicuous, a vessel may borrow towards it with a commanding breeze; otherwise, it will be prudent to keep mid-channel between it and Red island. The peak of Great Durian bearing S.E. a little southerly,* or east point of North Passage island in line with the peak of False Durian, bearing S.S.E., will lead mid-channel between the patch off Red island and Middleburgh shoal. In working, do not bring the peak of False Durian above a ship's length open westward of North Passage island, nor stand nearer to the reef off Red island, than to bring that peak nearly on with South Passage island. The tides are very strong between Middleburgh shoal and Red island, the flood setting to the southward, and the ebb to the northward, from 8 to 4 knots on the springs.

The channel westward of Middleburgh shoal is preferable, being about $2\frac{1}{4}$ miles wide, with mostly regular soundings from 16 and 17 fathoms close to the shoal, decreasing gradually towards the Sabon shore, over a bottom of soft mud, proper for anchorage. When clear of North

* Horsburgh says S.E. $\frac{1}{2}$ S., but that appears to lead very close to the reef off Red island.

Passage island, haul to the westward for the Sabon shore, then steer about N.N.W. along it, in 7 fathoms, which will lead in the fair track between that shore and Middleburgh shoal. When Red island bears East, or E. by S., edge out a little, about N. by W. or North, and deepen to 10 or 12 fathoms; continuing to keep in these depths, steer to the northward, taking care to give a good berth to the south end of Great Carimon, to avoid the bank of $2\frac{1}{2}$, 3, and $3\frac{1}{2}$ fathoms, sand and mud, which projects 3 miles from the south point of that island. When abreast of this point, the distance of 4 or 5 miles should be preserved from the east side of Great Carimon, and the Little Carimon may be rounded at any convenient distance, if bound to the northward.

In working, do not deepen towards Middleburgh shoal to above $8\frac{1}{2}$ fathoms, as there are 9 fathoms very near its western edge; but the Sabon shore may be approached to $5\frac{1}{2}$ or to 5, or even $4\frac{1}{2}$ fathoms, in a small ship.

To pass through Phillips Channel.—If bound to Singapore, having passed between Middleburgh shoal and the Sabon shore, and brought Red island to bear East or E. by S., a course about N.E. by N. may be steered, guarding against tide, to pass through Phillips channel to the westward of Doncan island and between Cap island and Round island, neither of which should be approached nearer than three-quarters of a mile, on account of the reefs which project from them.

In this route take care that the vessel is not set too near the dangers which lie at the entrances and near the points of the straits of Muro, Suji, and Jombol, for the tide rushes through them with a velocity of 3 or 4 knots at springs. After shaping a course to pass between Cap and Round islands, the dangers off Red island and the Twins will be avoided, by not bringing Doncan island to the northward of N.E. by E.; and Cap island kept on a N.E. or N.E. by N. bearing will lead well to the westward of the dangers extending from Pulo Doncan.

Having passed Cap island, bring it to bear S. by W. $\frac{3}{4}$ W., or S.S.W. astern, which will lead through in mid-channel between Round and Long islands to the west, and Helen Mars reef to the east. The soundings in this track are very variable, 15 to 35 fathoms.

In working, if standing westward of the south end of Round island, do not go farther in that direction than to bring Raffles lighthouse on with the north-west end of Long island, to avoid the rocky reefs lying to the south-west of Red island (page 231); between the latter island and these reefs the soundings are irregular.

Standing towards the north-east sides of Round and Long islands, to avoid the reefs which extend from them, the Cap should not be brought south of S. $\frac{1}{2}$ W., or Raffles lighthouse east of N. by E. The Cap, if not brought west of S.S.W. $\frac{3}{4}$ W., or Steep Cape, the bold head-

land inside Cap island, kept to the south of S. $\frac{1}{2}$ W., will keep the vessel clear of the Helen Mars reef; and when the northern peak of Great Carimon is well open northward of Red island, a vessel will be northward of that danger, and may proceed to the north-eastward into the fairway of the main channel of the Singapore strait. To proceed from thence to Singapore road *see* page 298.

If preferred, instead of using Phillips channel, a vessel after passing between Middleburgh shoal and the Sabon shore, may steer a North or N. by E. course, and passing to the westward of Tree island, proceed to Singapore road by the main channel, as directed at page 297.

DIRECTIONS from SINGAPORE STRAIT through DURIAN and VARELLA STRAITS to BANKA STRAIT.*—Having proceeded as far as Raffles lighthouse, according to the directions given at page 297, and brought it to bear W.N.W., or N.W. by W., distant about $1\frac{1}{2}$ miles, Cap island will be seen bearing about S. by W. $\frac{3}{4}$ W. or S.S.W., and kept upon either of those bearings it will lead about mid-channel between Helen Mars reef and Round island. In working, Cap island must not be brought west of S.S.W. $\frac{3}{4}$ W., or Steep cape west of S. $\frac{1}{2}$ W., to avoid Helen Mars reef. The dangers extending from Round island and Long island will be avoided by not bringing Cap island south of S. $\frac{1}{2}$ W.

Having passed westward of the Cap, which must not be approached nearer than half a mile, a course about S.W. or S.W. by S. may be steered towards the Sabon shore, but as before noticed, be particularly careful to guard against the effects of the tide in this locality.

Cap island kept on a N.E. or N.E. by N. bearing, will ensure a vessel passing well to the westward of the dangers near Doncan island, and after that island is passed, it should not be brought north of N.E. by E., until she is in 7 fathoms on the Sabon shore, so that she may not get too near the dangers lying off the Twins and Red island.

With a commanding breeze, the passage eastward of the Middleburgh shoal may be taken by keeping the east point of North Passage island in line with the north-west peak of False Durian, which will lead mid-way between the shoal and the rocky patch: the water deepens towards the Middleburgh shoal, it being steep to all around. To prevent being set upon it in light winds, caution is requisite, as the tides run here from 3 to 4 miles an hour at times, with strong ripplings, which are likely to prevent the vessel from steering.

A vessel being abreast of Little Carimon, with its northern end bearing West from 2 to $2\frac{1}{2}$ miles, a S.S.E. $\frac{1}{2}$ E. course will carry her clear of the

* Mostly from Horsburgh.

mud-banks fronting the low land of Great Carimon, in soundings from 7 to 8 fathoms, until the north end of Pandan island is on with the north end of Sabon, when the strait between Great Carimon and Sabon will be open. With a working wind from Little Carimon the soundings are the best guide in standing towards the mud-banks fronting Great Carimon, which ought not to be approached under 6 fathoms, remembering that the peaks of Little Carimon in line bearing about N.W. lead close to the edges of the shoal banks; the depths in the offing are from 14 to 16 fathoms mud. The peaks of Little Carimon in line, will lead outside the dangers off Great Carimon, as will also Pandan bearing South.

When the strait between Great Carimon and Sabon is open, the soundings become irregular; and here caution is requisite with a working wind, as the tides set strong through this strait to the westward at times. When the north end of Pandan is on with the north end of Sabon, and the vessel is distant from the former 3 miles, in 7 fathoms, a S. by E. course will lead clear of the mud-bank that fronts Buru, and midway between it and Middleburgh shoal, till the north end of Red island is on with the south end of the South Twin, and the soundings will be irregular, from 5 to 9 fathoms.

In working, a vessel may stand to the eastward to a moderate distance at discretion, but she must not approach the shore of Buru nearer than $1\frac{1}{2}$ miles in 5 to 6 fathoms. When the south end of Buru bears West, the soundings will decrease regularly on the edge of the mud bank which extends southward as far as Deep-water point, and the mud-bank may be borrowed on at discretion. Standing eastward towards Middleburgh shoal, do not approach it nearer than to bring the west end of North Passage island to touch the east end of South Passage island; the north end of Red island on with the bluff-headland to the eastward, will lead northward of the shoal, and the north end of Red island on with the south end of the Twins, will lead southward; the latter transit-line also just clears to the northward the rocky patch lying to the westward of Red island.

When clear of Middleburgh shoal, and of the shoal to the westward of Dolphin island, as the strait to the southward is free from danger, a direct course may be steered for the east end of False Durian; the Passage islands may be approached to any convenient distance. Princes island must not be neared much under a mile, as dangers extend a considerable distance from it. The soundings throughout are very irregular, decreasing towards the western shore where there is good anchorage. At $1\frac{1}{2}$ miles from the north-western and largest of the two rocky islets off the north-west end of False Durian, and it being on with the peak of the latter, there is a bank of hard sand and stones three-quarters of a mile

in extent, having $4\frac{1}{2}$ fathoms least water, and from 10 to 6 fathoms close-to; when on it, the east side of South Passage island is on with the north end of Little Durian.

Standing towards the south end of Great Durian, come no nearer the Tombs than one mile, when South Passage island will bear N.W. by W. $\frac{1}{4}$ W., to avoid the small reef of coral rock lying half a mile from the south Tomb, and near to which are 20 to 29 fathoms. The best anchorage in this part of the strait will be found about three-quarters of a mile from the eastern shore of False Durian, in 12 to 14 fathoms. With a working wind, keep near False Durian, where the tides are much stronger than in mid-channel; but take great care to bring Rooky islet to the west of S. by W. before the peak of False Durian bears West, to keep clear of Richardson shoal.

To pass westward of the Brothers, between them and False Durian, steer through in mid-channel; but with a working wind, either side of the channel may be borrowed on, when to the southward of Richardson shoal.

After passing Rocky islet, off the south-east end of False Durian, keep it west of N.N.W. until to the southward of the 3-fathoms bank, lying nearly a mile south of it.

To pass eastward of the Brothers, after passing the Tombs steer E. by S., keeping about 2 miles from the north and east sides of the North Brother, where the water will shoal to 12 or 13 fathoms; then steer about S. by E., attending to the set of the tide, to pass the Middle and South Brother at the same distance, not borrowing nearer them than 10 or 12 fathoms. With a working wind, do not stand too far over towards the Eastern bank, but tack immediately, if irregular soundings are got on the overfalls near it, nor so far out as to sink the beach* of the Middle Brother from the deck. The depths in this channel will be mostly from 10 or 12 fathoms near the Brothers, to 16 or 18 fathoms near the overfalls on the edge of the Eastern bank.

Being abreast of the South Brother, at about 2 miles distance, steer South or S. by W. until it bears N.N.W.; and whether the vessel has passed eastward or westward of the Brothers, after having brought the South Brother to bear N.N.W., steer about S. by E. $\frac{1}{2}$ E. towards the Alang Tiga islands, and endeavour to keep in from 14 to 16 fathoms. With a working wind the best track is to stand to the eastward until in 17 fathoms, about mid-channel, and into 12 fathoms towards the Sumatra shore, but not under this depth in passing Dato and Basso points, as the shoal fronting

* These marks are not applicable to vessels whose decks are very high from the water.

the latter is steep-to, with 8 to 14 fathoms near its edge. After passing Basso point, the coast may be approached occasionally to 6 or 7 fathoms; but the best track with a fair wind is about mid-channel between it and the Alang Tiga, or pass about 2 or $2\frac{1}{2}$ miles westward of these islands at discretion.

Having passed the Alang Tiga, keep the southernmost island to the north of N.W. by N. until Seera island bears East or E. $\frac{1}{2}$ S., to avoid the Speke rock; the proper track from the Alang Tiga to Varella is to keep along the Sumatra coast in 9 to 12 fathoms, borrowing to 6 or 7 fathoms towards the coast, with a working wind.

Caution is however necessary if running here in thick weather or in the night, on account of strong tides setting into or out of the rivers, for the *Princess Charlotte*, at 1 A.M., April 11th, 1813, steering S.E. by E., shoaled suddenly from 14 to 8 and 5 fathoms, then grounded on a bottom of sand and mud on the extensive bank fronting the coast to the westward of Tanjong Jaboeng, opposite the mouth of the Jambie river. At daylight Varella was said to bear E.N.E., Linga peak N.N.E. $\frac{1}{2}$ E., Tanjong Jaboeng S.E. by E. $\frac{1}{2}$ E., the Sumatra shore distant about 6 or 7 miles, observed lat. $0^{\circ} 55'$ S. Having grounded at high water, the tide fell from 18 to 10 feet, and with every exertion, by rafting the spars alongside, starting water, and throwing 1,332 bags of rice overboard, to lighten the ship, she could not be floated off until the 15th, four days after she grounded on the bank.

Varella island may be passed at about 2 miles distance in 10 or 12 fathoms; but the spit surrounding Tanjong Jaboeng is steep from 5 fathoms, and should be approached only with great caution under a depth of 10 fathoms in working.

From a position about 8 miles East from Tanjong Jaboeng to abreast Batakarang point, at the entrance of Banka strait, the course is about S.S.E., and the distance 66 miles, and the whole of the bank fronting the coast is in this space very flat, with regular soundings upon it, except the horn or spit with only 4 fathoms on it, lying 9 miles south-eastward of Tanjong Jaboeng. The best guide, therefore, after leaving Varella, is to keep along the coast in from $5\frac{1}{2}$ to 7 fathoms, until Batakarang point is approached; and $6\frac{1}{2}$ or 7 fathoms are the proper depths to preserve, when passing this point and entering Banka strait, to avoid the Frederick Hendrik rocks, on the east side the channel: with a working wind, the point may be approached to $5\frac{1}{2}$ or 5 fathoms.

CHAPTER IX.

SINGAPORE STRAIT.

VARIATION $1\frac{1}{2}^{\circ}$ East, in 1866.

GENERAL DESCRIPTION.—Singapore strait is bounded on the north by the Malay peninsula and Singapore island, and on the south by the large islands of Bintang, Battam, and Boelang, with numerous small islands and banks near its western entrance. The entire length of the strait is about 50 miles. Its breadth, at the eastern entrance, between Brakit point on Bintang island and Romania point on the Malay peninsula, is 20 miles; and at the western entrance, the main channel of the strait, between the Rabbit and Coney and the islands to the southward, is barely 3 miles wide.*

Owing to the many dangers which lie at both entrances of this strait, its navigation was formerly attended with much difficulty and anxiety, but such has ceased to be the case since the erection, in 1851, of a lighthouse upon Pedra Branca rock, in the middle of the eastern entrance, and another upon the Coney, at the western entrance. These are well situated, so that with common attention the strait can now be navigated either by day or by night, without risk or delay.

For the sake of convenient reference it has been thought best, in describing this strait, to divide it into three portions, viz., Singapore strait, eastern part; Singapore roads and town, and New harbour; and Singapore strait, western part. The eastern part to comprise a description of the strait from its eastern entrance to Singapore roads, and the western part, from Singapore roads to its western entrance.

PEDRA BRANCA, or White rock, in lat. $1^{\circ} 19' N.$, long. $104^{\circ} 26' E.$, lying in the middle of the eastern entrance of Singapore strait, is 150 feet long, 100 feet broad, and 24 feet above the level of high water spring tides. Its position will be readily known by the lighthouse, 93 feet high

* See Charts:—Singapore Strait, Sheets II. and III., Nos. 2,403 and 2,404, scales $m = 0.65$ of an inch; Banka strait to Singapore, No. 2,757, scale $m = 0.15$ of an inch; and China Sea, Sheet I., No. 2,658, scale $m = 0.05$ of an inch.

from base to vane, which was erected on it in 1851, and named after the celebrated hydrographer, Horsburgh, whose labours have in a high degree benefited the interests of navigation and commerce in every part of the eastern seas. The lighthouse is a pillar of granite, and the lantern is covered by a spherical dome, painted white. The largest island off Romania point bears from it W. by N. $\frac{1}{3}$ N. about $7\frac{1}{2}$ miles; it is the same distance from the shore of Bintang, and is in one with the centre of Bintang Great hill, bearing S. by E. $\frac{1}{4}$ E.

LIGHT.—The lighthouse on Pedra Branca exhibits a *revolving white* light, which attains its brightest period once *every minute*; its greatest brilliancy is of *fifteen seconds* duration, when it gradually declines until it totally disappears to a distant observer; but within a short distance of the lighthouse it is never entirely invisible. The light is elevated 95 feet above the level of high-water springs, and should be seen in clear weather at a distance of about 15 miles.

DANGERS near PEDRA BRANCA.—With the exception of a patch of 4 fathoms, the north and north-west sides of Pedra Branca are steep-to, there being 17 fathoms close to the rock, and 30 to 36 fathoms near it.

This 4-fathoms patch lies about a quarter of a mile northward of the rock, and is the only shoal spot between it and the Romania shoals, in which space the depths are very variable in mid-channel, 17 to 32 fathoms, but they become more regular, 17 to 14 fathoms, towards the Romania shoals.

The east, south, and south-east sides of Pedra Branca should not be approached nearer than a mile, for there are dangerous rocky patches to the distance of half a mile from the east side; and the south and south-east sides are foul to three-quarters of a mile, at which distance South and S.S.E. $\frac{1}{4}$ E. from the lighthouse are two dangerous ledges, named Middle rocks, which are but little above the surface at high water. Eastward a short distance from the Middle rocks is a patch of 4 fathoms, and North a quarter of a mile from this patch is a rock with only 3 feet of water over it.

SOUTH LEDGE, called by Horsburgh the South-west rocks, is very dangerous. It consists of three pointed rocks, very little detached from each other, with 8 and 9 fathoms close to, and 16 or 18 fathoms at a short distance from them in their stream. They are of small extent, not visible until the ebb has been made some time, and are nearly covered before the stream of flood begins to run. Horsburgh lighthouse bears from them N. by E. $\frac{2}{3}$ E., distant 2 miles; the large Romania island N.W. by W. $\frac{1}{3}$ W. $7\frac{1}{2}$ miles; and the outer hill on Brakit point E.S.E. $12\frac{1}{2}$ miles.

Between the South ledge and Middle rocks the distance is about $1\frac{1}{2}$ miles, and the depths 15 to 20 fathoms; and between the South ledge and Diana shoal the distance is $4\frac{1}{2}$ miles, and the depths vary from 12 to 18 fathoms, decreasing under 11 fathoms within a mile of the Diana, and shoaling to 8 fathoms close to that danger.

SOUTH SIDE OF EASTERN PART OF THE STRAIT.

BINTANG is the largest island on the south side of Singapore strait; Battam island, on the west side of Rhio strait, is also of considerable size, and from it a chain of islands, separated by narrow guts, extends westward, terminating nearly opposite the Rabbit and Coney.

The north side of Bintang is about 16 or 17 miles in length, nearly E. by N. and W. by S., the greater part being taken up by the large bay of Sumpat; several dangers lie off it, which will be described in detail farther on. Like most of the other land bounding the strait of Singapore, it is covered with trees, and, excepting the hills inland, is not much elevated.

BINTANG GREAT and LITTLE HILLS.—Bintang Great hill, in lat. $1^{\circ} 4' 20''$ N., long. $104^{\circ} 29'$ E., bearing S. by E. $\frac{1}{4}$ E. about $16\frac{1}{4}$ miles from Horsburgh lighthouse, may be seen in clear weather 40 miles, being 1,230 feet high, and is a good mark in approaching the entrance of the strait from the northward. When viewed from that direction, it forms a saddle and adjoining it, on the north side, there is a small conical hill, called False Bintang hill, or Bintang Little hill, 762 feet high, the summit of which is central with the saddle of the large hill bearing S. 8° E. When the centre of the saddle bears South (*true*), the summit of the Little hill is just open with the western shoulder of the large hill; and this mark or bearing of Bintang hill is a safe guide to carry a vessel to the eastward of, but pretty near to the North patch, the outermost of the Romania shoals.

TANJONG BRAKIT, the north-east point of Bintang island, has some hills on its east side, 217 feet high, and others a mile farther to the southward 267 feet high. Reefs and dangers extend $1\frac{1}{2}$ miles from this point, within the margin of which lie the following:—

Pulo Coco, an island 40 feet high, narrow, but three-quarters of a mile long, lies close to and appears to form the eastern side of Brakit point: it may be approached to a distance of half a mile.

Pulo Brakit, 30 feet high, is an island about half the size of Coco, lying half a mile N.N.E. from the northern part of Brakit point: it should not be approached nearer than three-quarters of a mile, for the shore reef projects nearly half a mile outside of it.

Black Rocks are a cluster of dark coloured rocks lying off the north extreme of Brakit point, the outermost rocks being distant nearly a mile from the shore. The shore reef extends some short distance outside these rocks, and a tongue of sand, with but 3 fathoms water over it, projects a third of a mile from their outer edge. The outer end of this tongue lies North, distant $1\frac{1}{2}$ miles from the north extreme of the point.

BRAKIT ROCK, discovered in 1861 by Mr. Stanton, commanding H.M.S. *Saracen*, is a cable in length, N.W. and S.E., and half a cable in breadth, with 2 fathoms over it at low water, and 10 to 12 fathoms close to all round. It lies N.N.E. $\frac{3}{4}$ E. $2\frac{3}{4}$ miles from Tanjong Brakit, and from its southern and shoalest part the northern extreme of Pulo Sumpat appears in line with the apex of Little Bintang hill S.W. $\frac{1}{4}$ S., and Horsburgh lighthouse bears W. by N. $\frac{1}{2}$ N. $12\frac{1}{2}$ miles. A conspicuous double tree on a long hill 4 miles from Tanjong Lokan appears just inside the point bearing S. $\frac{1}{2}$ W. This tree kept well open of Tanjong Lokan clears the eastern side ; Pulo Panjang peak S.E. $\frac{1}{2}$ S. will clear both the eastern and northern sides. Barbukit hill about four times its own breadth open eastward of Horsburgh lighthouse will also lead a vessel northward ; and Little Bintang hill well open northward of Pulo Sumpat will lead to the westward.

The channel between the Brakit rock and the point is free from danger, with depths decreasing from 13 and 14 fathoms near the rock to 9 and 6 near the reefs which extend from the point. It is not, however, advisable to use this channel except in cases of emergency.

POSTILLION REEF, composed of coral and sand, and having 2 fathoms water over it, lies nearly half a mile outside the shore reef extending from Brakit point ; between them are depths of 4 to 8 fathoms. Depths of 4 fathoms extend more than half a mile from this reef in a north-west direction, but in directions the same distance north and north-east from it, the soundings vary from 5 to 8 or 9 fathoms. Horsburgh lighthouse bears from this reef N.W. by W. $\frac{3}{4}$ W., nearly $10\frac{1}{2}$ miles.

A SHOAL, apparently about half a mile in extent, having $1\frac{1}{2}$ fathoms water over it, is marked on the chart S.W. by W. $\frac{1}{2}$ W. $1\frac{1}{2}$ miles from Postillion reef, W. by N. $\frac{1}{2}$ N. a little over $2\frac{1}{2}$ miles from Tanjong Brakit, and S.E. by E. $9\frac{1}{2}$ miles from Horsburgh lighthouse. This shoal seems not to have been properly examined, nor has its exact size been determined, and no soundings are given near it.

TULLOE SUMPAT or Sumpat bay, is the extensive bight between the western extreme of Tanjong Brakit and Tanjong Batu Sow, which lie W. $\frac{3}{4}$ S. and E. $\frac{3}{4}$ N. of each other $9\frac{1}{2}$ miles apart. Its deepest part is

between the western part of Tanjong Brakit and two points which lie E.S.E. 6 miles from it, named Batu Scool and Batu Rumpit, and close off which are some rocks above, and others below water.

Pulo Sumpat, a small island 178 feet high, lying in the eastern part of Sumpat bay, may be readily known by its saddle shape. It lies $2\frac{1}{3}$ miles South of the shoal last mentioned, and S.E. $\frac{1}{4}$ S. $1\frac{1}{2}$ miles from the western extreme of Brakit point. Half a mile north-eastward from it is a rock above, and others below water, and it seems probable that the reef which surrounds Tanjong Brakit, continues to project from the coast as far as this island.

Two Reefs lie near the bottom of Sumpat bay, the outer of which is nearly a mile distant from a rocky point on the shore, about 2 miles W. by S. $\frac{1}{2}$ S. from Pulo Sumpat, and $2\frac{1}{4}$ miles E. $\frac{3}{4}$ N. from Tanjong Batu Scool. Near these reefs are 7 or 6 fathoms, but there appears to be good anchorage farther out in 11 to 8 fathoms.

DIANA SHOAL, about half a mile in extent, has but $2\frac{1}{2}$ fathoms water over it, 4 fathoms close around it, and 7 and 8 fathoms a short distance from it. From its outer edge Tanjong Brakit bears E $\frac{1}{4}$ S. distant $8\frac{1}{2}$ miles; Tanjong Batu Sow S.W. 3 miles; and Horsburgh lighthouse N. by W. $\frac{1}{2}$ W. 6 miles.

A little more than half a mile in a W.S.W. direction from this shoal is a sand patch with 4 and 5 fathoms water; and it seems probable that a bank may extend westward from the Diana to the Langui shoal, for the chart exhibits in places soundings of 5 fathoms between them, and it is quite possible that other, and perhaps shoaler, patches would be found if the locality were to be more thoroughly sounded. To avoid the Diana shoal, the north extreme of Tanjong Brakit should not be brought eastward of E. $\frac{1}{2}$ S.

LANGUI SHOAL, about a third of a mile in extent N.N.E. and S.S.W., lies W. by S. $\frac{1}{2}$ S. $4\frac{1}{4}$ miles from the Diana shoal. Over its south end there is but $1\frac{1}{4}$ fathoms water, and 3 fathoms over its north end. From its north end Tanjong Subong—the north-west point of Bintang at the entrance of Rhio strait—bears S.W. $\frac{3}{4}$ W. 4 miles, Tanjong Batu Sow E.S.E. a little over 2 miles, and Horsburgh lighthouse N. by E. $\frac{3}{4}$ E. $7\frac{1}{2}$ miles. Close to the northward of the shoal are 5 and 6 fathoms, and 10 to 12 fathoms at a short distance from it; but a bank with $3\frac{1}{2}$ to 6 fathoms water, extends $1\frac{1}{2}$ miles to the south-west of it.

This shoal and bank will be avoided by not bringing the point of Bintang, which lies a mile W.S.W. of Tanjong Batu Sow, to the eastward of S.S.E. until Pulo Skeree (Doea island), which lies on the east side of the entrance of Rhio strait, comes open of Tanjong Subong,

bearing about S.W. Horsburgh lighthouse bears from the Langui shoal N. by E. $\frac{3}{4}$ E. $7\frac{1}{2}$ miles ; the lighthouse or light therefore bearing N.N.E. $\frac{1}{4}$ E. will lead about a mile westward of this danger.

A THREE FATHOMS PATCH lies about half a mile to the southward of the Langui shoal, and between them are 6 to 7 fathoms water.

THE COAST between Tanjong Batu Sow and Tanjong Subong, forms a bay about three-quarters of a mile deep, and off its east point, which is about a mile W.S.W. from Tanjong Batu Sow, are some islets and rocks. Tanjong Pergam, the west point of this bay, projects nearly half a mile in a N.N.W. direction from the coast line ; some rocks lie half a mile off it in a N. by E. direction, and others not quite so far distant, to the north-west. About three-quarters of a mile E.S.E. from Pergam is another point, with rocks close off it, and several islets and rocks extending nearly three-quarters of a mile, in directions East and N.E. from it.

From Tanjong Pergam the coast line curves slightly in, and then trends in a westerly direction to a kind of knob point, about a third of a mile eastward of Tanjong Subong. At half a mile S.W. by W. from Tanjong Pergam is an islet called Pulo Pergam, with a rock awash about a third of a mile N.W. by W. from it.

A rock awash lies about a third of a mile N.E. $\frac{3}{4}$ E. from Tanjong Subong, and it will be avoided by keeping Tanjong Pergam to the southward of East until Tanjong Subong is eastward of South, and *vice versa*. A short distance eastward of this rock is a small islet with a rock to the southward of it.

CAUTION.—From the above description it will be seen that the whole of this part of the coast is fronted with dangers ; and as it has been but partially explored, and it is extremely probable that other dangers than those marked on the chart may exist, vessels are advised not to attempt to come inside the Diana and Langui shoals, but after passing westward of the dangers lying off and westward of Brakit point—which will be when Pulo Sumpat bears east of S.S.E.—they should keep that point south of E. $\frac{1}{2}$ S., until Pulo Skeree comes open of Tanjong Subong bearing about S.W.

TANJONG SUBONG, the north-western point of Bintang, and the **CROCODILE** and **PAN SHOALS**, in the entrance of Rhio strait, have been previously described at page 201.

TANJONG NONGSA, the most northern point of Battam island, bears W. $\frac{1}{4}$ N., distant $13\frac{1}{2}$ miles from Tanjong Subong ; South, nearly 11 miles from Johore hill ; and S. by E. $\frac{1}{4}$ E. $7\frac{1}{2}$ miles from the eastern extreme of Johore shoal. The shore reef which extends a mile off Tanjong Bomban, the north-east extreme of Battam, decreases in distance from

the shore towards this point, and off its eastern part, does not extend farther than 1 or 2 cables' lengths; but from thence in the direction of Pulo Nongsa, the reef projects nearly three-quarters of a mile.

PULO NONGSA, a small island a third of a mile in extent with a high tree upon it, lies $1\frac{1}{2}$ miles westward of Tanjong Nongsa, and about half a mile off the nearest point of Battam. It is surrounded by a reef, extending about a quarter of a mile from it, between which and the shore reef is a narrow channel carrying depths of 5 to 10 fathoms. A small islet lies close off its south end.

Pulo Nongsa is rather a conspicuous object when near this part of the strait, and if kept open of Nongsa point will lead a ship clear of the Little Pan shoal.

BOLLAN BAY, lying to the westward of Tanjong Nongsa, is nearly 3 miles wide at its mouth, between Tanjong Treng on the east and Tanjong Pengair on the west, and $2\frac{1}{2}$ miles deep, narrowing towards its head. The shores of the bay are fronted by reefs which extend about a quarter of a mile from the entrance points, and more than double that distance inside of them.

A detached reef lies at the entrance of Bollan bay, a mile distant E. $\frac{3}{4}$ N. from Tanjong Pengair. Eastward of this reef the depths are 4 fathoms for about three-quarters of a mile, and then 6 to 8 fathoms towards Tanjong Treng. Between the reef and Tanjong Pengair the depths are 4 to 8 fathoms.

Anchorage.—The best anchorage in this bay for vessels of moderate draught, appears to be with Pulo Nongsa bearing N. E. by E., and Tanjong Treng about E. by S. $\frac{1}{2}$ S. Small vessels may, with proper attention to the lead, go farther in, about S. by W., and anchor in 4 or $3\frac{1}{2}$ fathoms.

BATTAM BAY, the large bight immediately to the westward of Bollan bay, is nearly $7\frac{1}{2}$ miles wide, and 2 miles deep, being bounded to the eastward by the projecting point of which Tanjong Siquang is the north-west extreme, and to the westward by the two Sambo islands. In the depth of the bay are two islands about a mile apart, the eastern one of which is named Mangrove island. The shores of the bay are fronted by reefs, extending a short distance outside these islands; and S.S.W. $\frac{1}{4}$ W. $1\frac{1}{2}$ miles from Tanjong Siquang, is a small detached reef. The soundings in the bay vary from 10 or 12 to 18 or 20 fathoms, but very close to the reefs extending from the shores, are 6 to 8 fathoms, so that a vessel should be cautious in approaching them.

The **SAMBO ISLANDS**, forming the western limit of Battam bay, project from Battam island in a N.W. by N. direction, towards St. John's

islands on the opposite side of the strait. Pulo Sambo, the southern island, is nearly a mile long and about half a mile broad, and is distant a little over $1\frac{1}{2}$ miles from the nearest part of Battam, the channel between having a small islet and several reefs in it. Little Sambo, about half the size of Pulo Sambo, lies about a third of a mile to the northward of it. Both islands are fronted on their east sides by reefs which project nearly a third of a mile, and near to them are 9 to 12 fathoms water.

ROCKY LEDGES.—A rocky ledge, a third of a mile in extent, lies N.N.W. $\frac{1}{4}$ W., the outer part distant two-thirds of a mile from little Sambo; and half a mile to the westward of it is another rocky ledge. Those ledges are the outermost dangers on the southern side of this part of the strait, and near them are very irregular soundings, 13 to 25 or 26 fathoms, with one or two patches of 11 fathoms. Parts of these ledges are said to be always visible above water. There is also another rocky patch at a quarter of a mile W. by N. from Little Sambo.

NORTH SIDE OF EASTERN PART OF THE STRAIT.

The south-eastern part of the Malay peninsula, which forms the north-eastern limit of Singapore strait, is 17 or 18 miles westward of the meridian of Brakit point, the eastern limit of the strait; but the Romania islands with several rocks and dangers near them, together with the Romania shoals, North patch, and the Eastern bank, extend very nearly as far to the eastward as the meridian of Brakit point. These outlying dangers and banks will be described in detail, in the order they present themselves to navigators entering Singapore strait by the eastern entrance; but the following hills, as they form convenient land-marks for pointing out the entrance of the strait, will be first mentioned:—

BARBUKIT HILL, 645 feet high, bearing from Horsburgh lighthouse W. by N. $\frac{3}{4}$ N. $12\frac{1}{2}$ miles, is a regular pyramid rising from the low land, and, being only about 5 miles inland, is a very useful object in making out the entrance of the strait.

FALSE BARBUKIT, 432 feet high, is a low sloping hill near the sea, appearing like a tope of trees a little more elevated than the adjacent coast, which is all rather low and woody to the northward of Barbukit hill. It bears N.N.E. 6 miles from Barbukit hill, and N.W. from Horsburgh lighthouse, and being discernible during hazy weather much sooner than Barbukit hill answers as a guide in coming from the northward towards the northern extremity of the outer shoals.

The EASTERN BANK, the outermost of the shoal patches off Romania point, is nearly $1\frac{1}{2}$ miles in extent, with soundings of $7\frac{1}{2}$ to 10 fathoms

over it, and 11 to 14 fathoms close around it. It lies about a mile inside the range of the Horsburgh light, and from its outer edge the light bears S.W. by S., distant 14 miles; Barbukit hill W. by S. $\frac{3}{4}$ S.-southerly; and False Barbukit W. $\frac{1}{2}$ S.

Vessels getting soundings of 8 to 10 fathoms on this bank, during hazy weather, sometimes think they are on the northern patch of Romania outer reef, and then haul more to the eastward, which renders them liable to fall to leeward of the strait.

NORTH PATCH, lying $4\frac{1}{2}$ miles W. by S. from the Eastern bank, is generally considered the outermost of the Romania shoals, for the reason that the Eastern bank, not having less than 7 or 8 fathoms water over it, is not only not dangerous to the mariner, but is, in fact, useful to him, serving to determine his position; whereas the North patch, having but 4 fathoms water over it, is not safe for a large ship to cross in a swell or a heavy sea. The patch is nearly $1\frac{1}{2}$ miles long, North and South, and half a mile broad, composed of mud and sand, and has but 4 fathoms water over the greater part of it. It lies near the north end, and is the shoalest part of a bank about 5 miles long and 2 broad, with depths of 6 to 10 fathoms over it, and a 5-fathoms spot about a mile from its south end. From the north end of North patch, False Barbukit hill bears W. $\frac{1}{2}$ S. $12\frac{1}{4}$ miles; Barbukit hill S.W. by W. $\frac{3}{4}$ W. 16 miles; and Horsburgh lighthouse S. by W. $11\frac{1}{4}$ miles.

Bintang Little hill open to the westward of Bintang Great hill, leads half a mile eastward of the North patch.

THE ROMANIA SHOALS are a number of detached patches of sand and coral—various as to extent and depths of water over them—stretching in a south-westerly direction from the tail of the bank which extends to the southward of North patch, towards the rocks and dangers which lie outside the Romania islands. Between these patches are channels with depths of 8 to 10 fathoms water.

The limits of these shoals, to depths of 4 fathoms and under, lie between the bearings of N. by W. $\frac{1}{4}$ W. and N.W. $\frac{1}{2}$ W. from Horsburgh lighthouse, the distance on the former bearing being 6, and on the latter 5 miles. The least water shown upon the Admiralty chart is $3\frac{1}{2}$ fathoms, and this shoal portion lies between the bearings N. by W. $\frac{3}{4}$ W. and N.N.W. $\frac{1}{2}$ W. from Horsburgh lighthouse, and is about a mile in length, in a northerly direction. But it does not appear that $3\frac{1}{2}$ fathoms is the least water on these shoals, from the following account extracted from Horsburgh, and which should not be disregarded:—

“The patch of the outer reef nearest to Pedra Branca bears N.N.W. 4 miles from it, and is steep-to and dangerous, having on it 18 feet rocks.

On this patch the *Anna* struck in December 1800. With the wind north-westerly, rounding the edge of the reef very close in soundings from 12 to 9, and once 7 fathoms, a strong ebb tide running to the northward set us among the eddies upon the reef, and we had several casts of 7 fathoms. The outer edge of it, where the ship touched the rocks in hauling off the reef although drawing only 19 feet water, formed a steep wall, which was very conspicuous by the deep-blue water outside, and the white discoloured water within. She took a considerable careen by the fresh wind and strong tide, and grazed over the rocks into 12 fathoms the first cast, Pedra Branca bearing then S.S.E. $\frac{3}{4}$ E. about $4\frac{3}{4}$ miles, South island off Romania point S.W. by W. $\frac{3}{4}$ W., south point of the largest island W. by S. $\frac{1}{4}$ S., and its southernmost hump in one with the south cape or westernmost point of Romania. A few cables' lengths to the southward of this dangerous patch the depths increase to 16 and 17 fathoms, and it is thought to be the south-westernmost danger of the outer reef."

Outside the north-east limit of the shoal part of these reefs, the patches have depths generally of 6 to 8 or 9 fathoms over them, but there is one patch of 5 fathoms bearing N. $\frac{1}{2}$ W., and another of the same depth bearing N.W. by W. from the lighthouse.

South island, the southernmost island of the Romania group, just open of South point, the southern extreme of the Malay peninsula, leads to the southward of the Romania shoals; and Horsburgh lighthouse kept to the southward of S. by E. $\frac{1}{4}$ E., will lead to the eastward of those patches which have less than 5 fathoms over them.

The ROMANIA ISLANDS, fronting Romania point, are six in number; the westernmost or largest one is composed of two islands very near each other, joined by a reef; the northernmost and south-easternmost are two barren rocks; but the others are covered with trees. They extend about $2\frac{1}{2}$ miles N.E. and S.W., the largest being within a mile of the point, and the nearest to it. There is a rock, about 12 feet above water, near the south point of South island, and a reef of straggling rocks extending to the eastward, which are bold to approach on the south side.

DANGERS.—The following dangers lie contiguous to the Romania islands:—

Congalton's Carr, a rocky patch with $1\frac{1}{2}$ fathoms water over it, and 8 to 12 fathoms close to, is the easternmost of the dangers lying near the Romania islands. From it the middle of the largest island is in line with Peak rock, the latter distant a mile; North rock, the northernmost island, bears N.W.-northerly nearly 2 miles, and Horsburgh lighthouse E.S.E.-easterly $5\frac{1}{2}$ miles.

To avoid this danger do not bring the southern extreme of the largest

Romania island to the westward of W. $\frac{1}{2}$ N., or the centre of that island in line with Peak rock, until Tanjong Punji bears N.N.W. $\frac{1}{2}$ W.

Caution.—When the tide is running to the westward, vessels passing through the North channel must be very careful that they are not set too near this danger, of which the lead will not give them timely warning.

Jones Reef, having only one fathom water over it and 8 or 9 fathoms close to, lies N.N.W. $\frac{3}{4}$ W. a little over half a mile from Congaltons Carr, with Peak rock bearing S.W. $\frac{1}{2}$ W., distant three-quarters of a mile, and North rock N.W. $\frac{1}{2}$ W. $1\frac{1}{4}$ miles.

Whale Rock, or Whales Crown rock, lying W. by S. nearly a third of a mile from Jones reef, is a small ledge of rocks which is particularly dangerous, as it is only at about three-quarters ebb that a small round rock becomes visible and indicates the existence of the danger. It is steep-to, and the depth in its vicinity is irregular, being from 15 to 8 or 9 fathoms. Peak rock bears from it S.W. $\frac{1}{2}$ S., and North rock N.W. $\frac{1}{2}$ N., distant a mile.

A rock awash lies a short distance E.N.E., and a 4-fathoms patch about a quarter of a mile N.N.E. from Peak rock. Another 4-fathoms patch, with 12 fathoms near it, lies a short distance to the northward of Whale rock.

A Reef, about half a mile in extent and dry in places, lies between North island and North rock. Its eastern extreme bears North from Peak rock, distant three-quarters of a mile; and its western extreme rather less than half a mile S.S.W. from North rock. Upon its north-eastern extreme is the smallest of the Romania islands—a mere rock; and there is a 4-fathoms patch between it and North island.

Stork Reef, lying S.W. by W. $\frac{1}{2}$ W. about three-quarters of a mile from Congaltons Carr, is about 3 cables in extent, N.E. and S.W., and from its south-west point Barbukit hill is on with the north hump of the large Romania island bearing W. by N. $\frac{3}{4}$ N.; Peak rock N.W., distant a little more than half a mile; the point of Watering bay, the south-west part of Romania point, West; and Horsburgh lighthouse E. by S. $\frac{1}{2}$ S. 6 miles.

A Three-Fathoms Patch lies S.W. by W. two-thirds of a mile from Stork reef. South island bears from it N. by W. $\frac{3}{4}$ W. half a mile; the south end of the large Romania island N.W. nearly a mile; and South point W. by S. $6\frac{1}{4}$ miles.

A Rock awash lies with South island N.E. $\frac{1}{2}$ E., distant one-third of a mile, and the large Romania island N. by W. $\frac{3}{4}$ W. about the same distance.

A Four-Fathoms Patch lies nearly a mile W. by S. from the 3-fathoms patch, just mentioned; with South island bearing N.E. nearly a mile;

the large Romania island N. by E. $\frac{1}{2}$ E. three-quarters of a mile; and the largest Water island, West-southerly.

A Shoal with only $2\frac{1}{2}$ fathoms water over it, and which is the southernmost of the dangers near the Romania islands, lies with the large Romania island bearing N.N.E-easterly, distant $1\frac{1}{2}$ miles; Horsburgh lighthouse E. $\frac{1}{4}$ S. $7\frac{1}{4}$ miles; Romania point North $1\frac{3}{4}$ miles, and South point W. $\frac{1}{2}$ S. nearly $4\frac{1}{2}$ miles. There is a patch of $4\frac{1}{2}$ fathoms lying a third of a mile in a south-easterly direction from this shoal.

Clearing Mark.—There is deep water, 9 to 12 or 13 fathoms, very close to the above dangers. Tanjong Stapah, a point $3\frac{1}{2}$ miles to the eastward of South point, in line with South point bearing West, will lead clear to the southward of the last-mentioned patch of $2\frac{1}{4}$ fathoms, as also to the southward of all the dangers near the Romania islands.

ROMANIA POINT, or Tanjong Penyusoh, is the south-east extreme of the Malay peninsula, and, with the circumjacent coast, is level land covered with trees. The south-west extreme of the point is nearly $1\frac{1}{2}$ miles S.W. by W. $\frac{3}{4}$ W. from the south-east extreme, and, although it is rather conspicuous, no name has yet been given to it upon the chart. Between the extremes is a middle point with a small bay on either side.

Many rocks lie off Romania point, extending nearly half a mile from it in a southerly direction. A rock awash also lies a short distance off shore, between the middle point and the south-west extreme.

A shoal bank fronts this shore and extends outside these rocks, its edge being distant nearly three-quarters of a mile in a S. by W. direction from Romania point. Southward of the south-west extreme of the point, a tongue projects in an easterly direction from the shore bank, the outer part of which is three-quarters of a mile South of the point. Over this tongue are 3 fathoms water, but inside of it is a narrow gap of 4 and 5 fathoms.

Near the rocks off Romania point are depths of 5 fathoms, deepening to 11 fathoms at a short distance from them; but farther to the westward the bank may be approached to 8 or 7 fathoms, with proper attention to the lead.

EAST COAST of the MALAY PENINSULA.—The coast from Romania point turns sharply to the northward, and at the distance of a little over half a mile is a point with some rocks off it, from whence the land falls back forming a bay about a mile deep, the northern horn of which, named Tanjong Punji, bears N. $\frac{3}{4}$ E. $4\frac{1}{2}$ miles from Romania point; just to the southward of Tanjong Pungi is a small islet, named Pulo Punji, lying off the entrance of the Punji river. About $4\frac{1}{2}$ miles N. by W. $\frac{1}{4}$ W. from Tanjong Punji, is another point, named Tanjong Lompat, which bears

about West from the North patch, the outermost of the shoal patches which extend from the Romania shoals.

A shoal bank fronts the whole of the coast from the point a mile northward of Romania point to Tanjong Lompat. Abreast of Barbukit hill it projects $1\frac{1}{4}$ miles from the shore, nearly as far as the meridian of North rock, which bearing South leads close to its edge. Off Punji point it extends about half a mile, and off Lompat point three-quarters of a mile.

Except near that part of this bank extending from abreast of North rock to a mile nearly North of it, and which shoals suddenly under a depth of 9 or 8 fathoms, the bank may be approached by the lead with proper care, as the depths decrease pretty regularly under a depth of 10 to 6 fathoms.

The country abounds with various kinds of timber, wild elephants, buffaloes, moose-deer, hogs, guanias, monkeys, peacocks, &c., with oysters upon the rocks; but it is not inhabited hereabout. Near Romania river there is a considerable extent of forest, which being without much underwood is easily penetrated; but in other parts the woods are generally impervious.

Water.—Excellent water can be procured from the river close round the rocky point, about 6 cables' lengths north of Romania point.

The INNER CHANNEL, between Romania point and the islands, cannot be considered safe, and we refrain from giving any directions which might have the effect of tempting vessels to use it. Directions are given in Horsburgh for its navigation, but it is only within the last few years that it has been known to be dangerous. The *Sir James Brooke* steamer, which had frequently passed through it, at length struck upon a rock, and received so much damage that she had to be run upon the adjacent beach, where she became a wreck. The *Arratoon Apcar* steamer also struck upon a rock in the fairway of the channel, having $1\frac{1}{4}$ fathoms over it, and 3 fathoms around it.

Before this channel can be considered safe, it must be more closely surveyed, and a chart of it published on a tolerably large scale; but it is, in fact, of no great importance, as vessels can proceed more easily and safely by the North channel. The line drawn on the Admiralty chart* from the North rock outside Congaltons Carr to Romania point is a boundary inside of which it would not be prudent to venture.

The NORTH CHANNEL (the Great Inner channel of Horsburgh) is bounded on the east by the shoalest part of the Romania shoals, and on

* Banka Strait to Singapore, No. 2,757; scale, $m = 0.15$ of an inch.

the west by the dangers which lie to the eastward of the Romania islands. The channel is about $3\frac{1}{2}$ miles wide; there is one patch of 4 to 5 fathoms and another of 5 fathoms lying in its fairway, but there does not appear to be any less water, and it is now frequently used by those locally acquainted.

DIRECTIONS from the Northward.—Coming from the northward, and wishing to proceed into Singapore strait by the North channel, pass about midway between the North patch and the shore, and by the time False Barbukit hill bears West, Barbukit hill should bear S.W. by W. nearly, or in case Barbukit cannot be discerned, the south extreme of Tanjong Punji should bear about S.W. $\frac{1}{4}$ W.; a S. $\frac{3}{4}$ W. course will then lead through the channel by the middle track marked on the chart, which passes over the patch of 4 to 5 fathoms.

A vessel following this track will have soundings from 13 to 10 fathoms, until Barbukit hill bears about W. by S. or W. $\frac{1}{2}$ S., when they will decrease to 8 and 7 fathoms, and when Barbukit hill bears West to about 6 fathoms. She will then soon have 5 or $4\frac{1}{2}$ fathoms on the bank, except at low water spring tides, when there may be as little as 4 fathoms. The depths will soon increase to 8, 9, or 10 fathoms, and then suddenly to 13, or perhaps 15 fathoms, when she will be in Singapore strait. This 4-fathoms patch may be avoided and the banks crossed in not less than 6 fathoms water, by steering for Horsburgh lighthouse bearing S.E. $\frac{1}{4}$ S. to S.E. $\frac{1}{2}$ S.

Having crossed the banks, the S. $\frac{3}{4}$ W. course should be continued to avoid getting too near Congaltons Carr, over which there are but $1\frac{1}{2}$ fathoms. The middle of the largest of the Romania islands in line with Peak rock is the mark for this dangerous patch, and vessels should be cautious—extremely so when the tide is making to the westward—not to bring the east extreme of Punji point to the north of N.N.W. $\frac{1}{2}$ W., until Peak rock is north of the middle part of the largest of the Romania islands, or until the south end of the last-named island bears W. $\frac{1}{2}$ N. The vessel will then be to the southward of Congaltons Carr, and may steer S.W., but not more westerly, until Tanjong Stapah comes open south of South point, when she will be to the southward of all the dangers near the Romania islands, and may steer W.S.W. or W. by S., according to circumstances.

From the Southward.—In proceeding through the North channel from Singapore, take care, after passing South point, not to lose sight of Stapah point behind it, in order to avoid the $2\frac{3}{4}$ -fathoms patch and other dangers near the Romania islands. When the largest of those islands bears N.N.W., steer N.E., to pass about three-quarters of a mile outside

Congaltons Carr; but if the tide is setting to the westward, a more easterly course must be steered to avoid that danger, which will be done if the south end of the largest of the Romania islands be not brought westward of W. $\frac{1}{2}$ N., or Peak rock in line with the centre of that island, until the right extreme of Punji point bears N.N.W. $\frac{1}{2}$ W. With these marks on the vessel will be in about 13 or 15 fathoms water, and may steer N. $\frac{3}{4}$ E., through the North channel on the middle track line marked upon the Admiralty chart.

In following this middle track, the soundings will vary from 12 to 15 fathoms for the distance of the first mile, when they will suddenly decrease to 9 or 8 fathoms, and shortly after to 5 or $4\frac{1}{2}$, and if at low water spring tides, perhaps to 4 fathoms. Having crossed this shoal part of the bank—which is only about a third of a mile broad—the soundings will soon deepen to 6, 7, and 8 fathoms, and by the time Barbukit hill bears W. $\frac{1}{2}$ S., to 10 and 11 fathoms; from thence to the northward they will continue to be 12 or 13 fathoms until past the North patch.

A vessel will avoid the 4-fathoms patch and cross the banks in not less than 6 fathoms water, by keeping Horsburgh lighthouse S.E. $\frac{1}{4}$ S. to S.E. $\frac{1}{2}$ S., and steering the opposite course till the banks are crossed.

In Working through the southern part of this channel, Horsburgh lighthouse should not be brought to the southward of S.E. $\frac{3}{4}$ S. when standing towards the Romania shoals; nor to the eastward of S.E. by E. $\frac{1}{2}$ E. when standing towards Congaltons Carr or Jones reef. The soundings are not at all to be depended upon to guide a vessel near these latter dangers, for there are 12 fathoms in one direction and 6 in another very close to Congaltons Carr, and 9 or 8 fathoms close to Jones reef.

The SOUTH COAST of the MALAY PENINSULA, from the south-west extreme of Romania point, trends to the north-westward for about $1\frac{1}{2}$ miles to the entrance of a small river, the Songie Romynia. From thence the land curves away to the south-westward for $2\frac{1}{4}$ miles to Tanjong Romynia, between which and South point, which bears from it S.W. by W. $\frac{1}{2}$ W. nearly $1\frac{1}{2}$ miles, is a small bay, and the entrance of another small river, the Songie Kalarang.

WATER, or WATERING ISLANDS, is the name given to a small round island, about a quarter of a mile in extent, with an islet off its west extreme connected to it by a reef, lying N.E. by E. $\frac{1}{2}$ E. from Tanjong Romynia, the outer side of the island being distant about three-quarters of a mile from it. The islands can be approached on their south side to half a mile in depths of 5 or 4 fathoms, regular soundings, the 3-fathoms edge of the bank being distant about a third of a mile from them in a southerly direction; but eastward of the large island the edge of the

bank projects to a distance of 2 miles, forming the tongue, which has been previously described.

WATER.—Close around the south-west extreme of Romania point is Diana cove, where there is a stream of fresh water. The Romynia river, farther to the north-westward, has 2 or 3 feet water at its narrow entrance at low tide, and is navigable by boats 2 or 3 miles inland. Horsburgh remarks upon this river and other watering places as follows :—

“ Although nothing is found here but timber, fish, and reptiles, water may be procured with ease in this river, during the N.E. monsoon ; but there are several better and more convenient watering-places in the sandy bays between Romania point and Watering island. Inside this island there is an excellent stream upon the main, where fresh water may be obtained with facility in either monsoon ; but in the N.E. monsoon the streams between it and Romania point are more convenient. In the eastern extreme of the long sandy bay, which contains Watering island at its western part, there is a large rivulet, having shoal water projecting a considerable way out from the entrance, with rocks containing beds of excellent oysters.”

SOUTH POINT, or Tanjong Telimpang, the most southern point of this part of the Malay peninsula, bears W.S.W.-southerly 5 miles from Romania point. The 3-fathoms edge of the shore bank which fronts this part of the coast, is distant about a third of a mile from South point ; the soundings near it decrease rather suddenly from 10 or 9 fathoms.

TANJONG TEERAM, bearing W. $\frac{1}{2}$ N. $2\frac{1}{2}$ miles from South point, has rocks, both awash and below the water, lying off it, and there are also many between it and South point ; but they are all within the margin of the 3-fathoms edge of the shore bank, which extends along this coast and projects nearly half a mile from Tanjong Teeram.

TANJONG STAPAH, about $1\frac{1}{2}$ miles westward of Tanjong Teeram, is a good mark when kept in line with South point, from which it bears West-northerly distant $3\frac{1}{4}$ miles, to keep vessels well clear to the southward of all the dangers near the Romania islands. This point appears to be pretty bold close to, there being 8 and 10 fathoms about a third of a mile from it ; but vessels are recommended to give it a berth of at least half a mile.

DANGERS.—A patch of dry bank, with 5 and 6 fathoms water close to, lies about three-quarters of a mile W. by N. from Tanjong Stapah. It seems, however, to be but part of a shoal bank which fronts the coast to the distance of a mile, between Tanjong Stapah and Johore point.

The Malang Berdaun are a rocky cluster, some above and others below water, the outer rocks of which lie South nearly three-quarters of

a mile from Johore point, and within the edge of the shore bank just described.

Clearing Marks.—The dry patch above mentioned will be avoided if Tanjong Teeram be not lost sight of behind Tanjong Stapah, or South point kept *well* open of Tanjong Stapah, until Johore hill bears N.N.W. To avoid the edge of the bank and the Malang Berdaun rocks, after Johore hill is brought N.N.W., South point must not be shut in behind Tanjong Stapah until Little Johore hill bears N. $\frac{1}{2}$ W.

These dangers are, however, quite out of the ordinary track of vessels as they lie inside the Johore shoal.

JOHORE POINT, bearing N.W. by W. $\frac{1}{2}$ W. $3\frac{1}{2}$ miles from Tanjong Stapah, is a bluff promontory forming the eastern side of the entrance of Johore river and of the Old Strait of Singapore.

The edge of the shore bank and the Mallang Berdaun rocks extend nearly three-quarters of a mile to the southward of Johore point; but in a south-westerly direction from it, the bank does not project farther than a third of a mile, while the northern part of the point has 4 or 5 fathoms close to.

JOHORE HILL, 660 feet high, is of a regular, oblong, sloping form, and covered with trees. Standing but a very short distance inland from Johore point, it is one of the most conspicuous objects in, and serves as a useful landmark for navigating, the strait of Singapore.

LITTLE JOHORE HILL, 749 feet high, rises N. by W. $\frac{3}{4}$ W. $5\frac{1}{2}$ miles from Johore hill. Although higher, this hill is not so extensive as Johore hill, but it is also useful as a landmark.

JOHORE CHANNEL* is between the dangers extending to the southward of Johore point and Johore shoal. It is about $2\frac{1}{2}$ miles wide, with deep water, 17 or 16 fathoms, close to the shoal, and 12 or 11 fathoms in about mid-channel, decreasing to 9 fathoms towards Johore point; but there is deeper water, 16 fathoms, between the depths of 11 and 9 fathoms and the shoal bank southward of Johore point.

CALDER HARBOUR is the name given to the entrance of one branch of the Johore river. It lies just round Johore point, bounded on one side by the bank fronting the coast to the north-westward of Johore hill, and on the other by the extensive bank which projects from Pulo Tikong Besar. The breadth of the harbour is three-quarters of a mile, with anchorage in $5\frac{1}{2}$ to 9 fathoms.

TIKONG BESAR, and **TIKONG KETCHIL** are the two islands lying north-westward of Johore point, at the entrance of the Johore river,

* See Chart of Sirangoon harbour and Johore Channel, No. 1,734; scale, $m = 2$ inches.

dividing that stream into two branches. Tikong Besar, as its name implies, is the larger island of the two, being in extent $3\frac{1}{2}$ miles east and west, and $2\frac{1}{4}$ miles north and south. Tikong Ketchil, or Little Tikong, lying close to the west side of the larger island, is in shape nearly round, its diameter being about two-thirds of a mile. There is a small islet, named Pulo Sijonkan, lying close to the south-east side of Tikong Besar; and another named Pulo Sijahat, at three-quarters of a mile to the southward of Tikong Ketchil.

KAPALA ROCKS appear to be three rocky heads awash, the outer one lying S. by E. $\frac{3}{4}$ E. rather more than $1\frac{1}{2}$ miles from the south point of Tikong Ketchil; $1\frac{1}{2}$ miles W. by S. $\frac{1}{2}$ S. from the south point of Tikong Besar, and 4 miles W. by N. $\frac{1}{2}$ N. from Johore point. From the outermost rock one of the other bears N.W. $\frac{1}{4}$ N. nearly a quarter of a mile, and the third N.E. by E. $\frac{1}{2}$ E. the same distance.

TIKONG BANK is the extensive shoal bank which surrounds both the Tikong islands, and also projects outside the islets and rocks just mentioned. Its edge is distant from Pulo Sijonkan, in the direction of Johore point, about $1\frac{1}{4}$ miles; and from thence takes a N.N.E. direction, passing about a quarter of a mile outside the east end of Tikong Besar. Southward of Pulo Sijonkan the bank extends farthest, its edge in this direction being distant nearly $1\frac{1}{2}$ miles from the islet. From this part the bank trends about W.N.W. passing just outside the Kapala rocks, and then curving in takes a north-westerly direction, projecting again westward of Pulo Sijahat, to the distance of a third of a mile. From thence it takes a northerly direction, and passing pretty close to Tikong Ketchil projects in the form of a long spit about $2\frac{1}{2}$ miles to the northward of that island.

The eastern side of this bank is rather steep, and must be approached with caution; on the south side the depths decrease more regularly, and it may be approached with proper attention in that direction by the lead; but its western side is steep close to from half a mile south-eastward of the Kapala rocks to its extreme northern point, and the lead will give no warning when nearing it.

The southern extreme of Johore point bearing East will lead to the southward of this bank; and to keep clear of that part of it near the Kapala rocks, Changhi point must not be brought to the westward of W. by N. $\frac{1}{2}$ N. until the western extreme of Tikong Ketchil bears N. $\frac{1}{2}$ W.

JOHORE SHOAL, or Allang Bau, fronts the entrance of the Old strait of Singapore, and may be considered as the horn or spit of the outer part of the bank extending about 6 miles eastward from the Red cliffs at the

east end of Singapore island. The shoal is about 2 miles long East and West, nearly a quarter of a mile broad, and is composed of hard sand, having $1\frac{1}{2}$ fathoms on its shoalest part at low water, 3 and $3\frac{1}{2}$ fathoms on its south extreme, and 12 to 15 fathoms very near to it, on the south, east, and south-west sides. From its east extreme the south end of St. Johns bears S.W. by W. $\frac{1}{2}$ W. ; Little Johore hill North ; Johore hill N.N.E. ; South point E. by N.-northerly ; and it is $3\frac{1}{4}$ miles distant from Johore point, and about $6\frac{1}{2}$ miles from the east part of Singapore island.

South Romania island open of South point leads clear to the southward of this shoal ; and when coming from the eastward it may also be avoided by not approaching the north shore under a depth of 17 fathoms after Johore hill bears North, or Burbukit hill N.E. $\frac{3}{4}$ E. Coming from the westward, St. Johns island should not be brought to the southward of W.S.W., after Little Johore hill bears N. by E., or Johore hill N.E. by N., nor the shoal neared under a depth of 17 fathoms until Johore hill bears North.

There is no safe passage for vessels of large draught between Johore shoal and the eastern extreme of Singapore island, although there are one or two narrow channels with depths of $3\frac{1}{2}$ and 4 fathoms between the patches which connect Johore shoal with Red cliff bank.

RED CLIFF BANK is an extensive flat of mud and sand, with some patches of rock and coral upon it, extending from the eastern part of Singapore island, between Changhi point and Tanjong Buddoh. The north-eastern edge of the bank projects about S.E. $\frac{1}{2}$ E. nearly 4 miles from Changhi point, its extreme forming a sort of horn or spit. From Tanjong Buddoh the bank projects in an easterly direction towards the Johore shoal, which, as before remarked, may be considered the outer horn or spit of the bank. These two horns thus projecting from the main part of the bank form a sort of basin between them, in which are depths of 7 to 12 fathoms.

The north-eastern side of this bank forms one side of the channel leading to the Old Strait of Singapore and the main entrance of Johore river. In proceeding through this channel, Changhi point, if not brought north of N.W. $\frac{3}{4}$ W. appears to lead well clear of the edge of the bank, until within half a mile of Changhi point, when a ship should steer to round the point at about a quarter of a mile distance ; but the chart exhibits but few soundings near the north-eastern edge of the bank, and therefore proper caution should be observed in standing towards it.

JOHORE RIVER.—Qualla Johore, or mouth of the Johore river, is bounded on the east side by the bank surrounding the south and west sides, and extending to the northward of Pulo Tikong ; and on the west side by Red Cliff bank, by the reef which projects eastward from Pulo

Ubin, and by Tanjong Kopo and the coast to the northward of it. Between the spit of Red Cliff bank, and the bank southward of Tikong Besar, the channel is about $1\frac{1}{2}$ miles wide, with depths of 7 to 13 fathoms; farther in between Pulo Ubin bank and the shoal bank opposite to it, the breadth is but three-quarters of a mile, with depths of 7 to 15 or 16 fathoms, excepting abreast of Pulo Tikong Ketchil, where there are, some patches of 5 fathoms.

The old town of Johore, once a place of considerable trade, now consists of some wretched huts built with bamboo and mud, where good water may be procured, but nothing else.* It stands about 10 miles up the river, which is navigable for ships the whole distance. It is not at all probable that European vessels will have to proceed to Johore for several years to come yet, although it is quite possible that the energy of the present Tumongong (the sovereign of Johore), may, in the course of time, again develop some trade there.

Such marks and directions as could be collected from the chart to assist a vessel in keeping clear of the banks which bound the Qualla Johore have been given with the description of those dangers, and it is unnecessary to repeat them here. Horsburgh gives some few directions for this river, but they are not now to be relied upon, and are therefore omitted. Should a vessel therefore have to proceed up the river, it would be necessary to obtain the assistance of a native pilot.

CHANGHI POINT, the north-east extreme of Singapore island, forms the south-east limit of the Old Strait of Singapore. It is low land with a white sandy beach, and bears about W. by N. nearly 6 miles from Johore point. A shoal bank extends about a cable's length from the point, close to which are depths of 6 fathoms.

OLD STRAIT OF SINGAPORE, the channel between the northern shores of Singapore island and the Malay peninsula, was formerly the passage by which all vessels proceeded between India and China, when the strait at present in use was not known to be navigable. Its western entrance has very much filled up, even since Horsburgh's time; he gives $3\frac{1}{2}$ fathoms in it as the least water, but the Admiralty chart now shows a bar of sand, with but 2 fathoms water on it, stretching across from Tanjong Gul to Tanjong Bolus.

No vessels now proceed through this strait, but they occasionally enter by the eastern or Johore channel to load granite at Pulo Ubin, or to load timber at a small town, about half way through the strait, close to Tanjong Putri in Johore, and which the present Tumongong is striving to bring into importance, having erected some extensive saw mills there,

* Horsburgh.

for the purpose of cutting up the timber as it is brought from the adjacent forests. But these vessels invariably enter and leave by the eastern channel, and it is not at all probable that the western part of the strait, which is extremely narrow and difficult to navigate, will ever again come into use, excepting, perhaps, for light draught steamers.

The eastern entrance of the Old strait is between Changhi point and Tanjong Kopo on the Malay peninsula, and is divided into two channels by Pulo Ubin. The coast inside Changhi point, trends to the westward for about $1\frac{1}{2}$ miles, when it falls back forming a bay, 3 miles wide, named Sirangoon harbour. About a mile inside Changhi point is a small river, with a few bungalows and a police station near it.

Several small rivers discharge themselves into Sirangoon harbour, the principal of which, the Sirangoon, is at its western extremity. About $1\frac{1}{2}$ cables westward of the east point of the harbour, are two white rocks, named Putih, with 13 fathoms close to them. The soundings in the harbour are from 7 to 14 fathoms, decreasing rather suddenly under 6 fathoms, so that a vessel need be cautious in approaching the shore.

Sirangoon island lies about a mile to the northward of the entrance of Sirangoon river, but the mud-bank which fronts all this part of the coast of Singapore extends outside this island, leaving the channel between it and the west end of Pulo Ubin barely half a mile broad.

Pulo Ubin or Obin, is about 4 miles long W. by N. and E. by S., and a mile broad. A shoal bank extends from its east end, three-quarters of a mile in an easterly, and a mile in a south-easterly direction, close to which are 8 or 9 fathoms. Nearly half a mile S.S.W. from its east end is a dangerous rock, named Papan, inside of which is the small islet Pulo Sikodo having a reef extending 2 cables westward of it. A 3-fathoms patch also lies about 2 cables off shore, southward of the saw mills and quarries, with 6 fathoms between it and the shore. Westward of the south point of Pulo Ubin is a small island, named Pulo Ktam, off the north-west extreme of which some patches of reef extend half a mile in a north-west direction.

The entrance of the Old strait between the shoal extending south-eastward from Pulo Ubin and Changhi point is half a mile wide, with depths of 13 or 14 fathoms in mid-channel, decreasing to 11 and 9 towards either shore. The breadth is nearly the same between Papan rock and the opposite coast, as also between the 3-fathoms patch and the Putih rocks; but between the south point of Ubin and the head of Sirangoon harbour, the distance is a mile, narrowing again between the north-west end of Pulo Ktam and the shoal bank, to three-quarters of a mile. Between the Putih rocks and Pulo Ubin, the depths are 18 fathoms in mid-channel,

but shortly after they decrease to 9 or 8, and then deepen again, southward of Pulo Ktam, to 13 or 14 fathoms, and for some distance they are thus irregular.

Horsburgh observes that "The Old strait is from 2 to $1\frac{1}{2}$ miles wide, and in entering, a mid-channel track is the best, with proper attention to the lead. Several small rivers empty themselves into the Old strait ; and in sailing through the small islands contiguous to Singapore should not be approached too closely. The soundings are irregular in passing Maljho river, and about mid-channel lies a reef of rocks : here the strait becomes much contracted, and abreast of Pulo Baru, where the reef is situated, it is steep-to, from 10 fathoms, with deep water in the channel, and the bottom is red clay ; this is the narrowest part of the strait. The soundings again become regular, and the channel takes a S.S.W. direction to the entrance of the strait."

The western entrance of the Old strait is the channel formed between Singapore island and Pulo Marambon. From Pulo Marambon, a shoal bank, with 1 and 2 fathoms water over it, stretches in a N.N.E. direction more than 2 miles, and a rocky bank fronts the coast of Singapore island opposite to it, and extending from it nearly half a mile, reduces the width of the navigable channel to one-third of a mile, and renders it very intricate. Abreast of Tanjong Campong, the depths are 4 and 5 fathoms, deepening to 6 and 8 fathoms towards Pulo Marambon. Abreast of that island are 6 and 5 fathoms, and about three-quarters of a mile outside of it are 3 fathoms, on the edge of the bar which extends across the entrance. There are but 2 fathoms over the bar at low water springs, but just outside of it are 9 and 11 fathoms, deepening to 14 or 16 fathoms, mud, a little farther out.

Water.—Fresh water may be obtained in several of the rivers in the Old strait.

The SOUTH-EAST COAST of SINGAPORE ISLAND, from Changhi point, takes a direction about S.W. by S. for $3\frac{1}{4}$ miles, and then curving round gradually, trends about W.S.W. 5 miles to Tanjong Catong, which forms the north-eastern limit of Singapore roads or harbour. A slight indentation in the coast line about 3 miles S.W. by S. from Changhi point, is known as Tulloh Mati Ikan (Dead Fish bay), just to the southward of which, where the shore begins to round away to the westward, are Tanjong and Tulloh Buddoh ; about midway between Tanjong Buddoh and Tanjong Catong is the village of Siglap, which may be known by two bungalows built on the summits of two hills about a mile inland, behind the village.

Red Cliff.—The south and south-east coasts of Singapore are level and woody. The most conspicuous objects are the Large Red cliff, or

Tannah Merah Besar, about S.W. $\frac{1}{2}$ S. $1\frac{1}{2}$ miles from Changhi point; and the Small Red cliff, or Tannah Merah Ketchil, in a small bight in the land, just to the south-westward of Tulloh Buddoh. The Large Red cliff is visible from a considerable distance to the eastward. Coming from the eastward the Small Red cliff will not open out until the Large Red cliff has been some time in sight.

A Shoal Bank fronts the whole of this part of the coast, extending to a distance of more than half a mile in places. The soundings decrease towards it with tolerable regularity, but large ships should not near it under a depth of 10 fathoms.

SOUNDINGS. — Approaching the eastern entrance of Singapore strait from the southward, when from 5 to 10 miles eastward of Pulo Ruig or Pulo Panjang (page 181), the depths will be generally 22 or 24 fathoms, with an occasional cast of 17 or 18, or perhaps 25 or 26 fathoms. Between Pulo Panjang and Brakit point, the south-eastern extreme of the strait, the depths are 20 and 21 fathoms at the distance of 20 miles from the Bintang coast, decreasing to 17 or 18 fathoms at 10 miles from it, and shoaling from thence gradually towards the shore. Ten miles north-eastward of Brakit point are 20 or 19 fathoms, decreasing towards Brakit rock to 14 and 13 fathoms, which depths will be found close outside that danger. A narrow bank of coral and sand, with 7 to 10 fathoms over it, lies 4 or 5 miles off Brakit point, between the bearings of N.E. and N.W. by N.; outside this bank are 14 and 13 fathoms, and 11 to 14 fathoms inside, with several patches of 9 and 10 fathoms. Towards Brakit point and the Postillion reef, the depths decrease with tolerable regularity, but vessels should not come under 10 fathoms.

In the South channel the depths are too irregular to be relied upon to guide a vessel safely. The 10-fathoms edge of the shore bank extends from the western part of Brakit point in the direction of Horsburgh lighthouse half-way across the channel, and from thence takes, with a very irregular outline, a direction about S.W. by W., passing about a mile outside the Diana shoal, and but a very short distance from the Langui shoal. There is, however, inside the edge of the bank, a space, the inner part of which is about half a mile outside the $11\frac{1}{2}$ -fathoms shoal off the western part of Brakit point, where the depths are 11 and 12 fathoms; and to the westward of these deeper soundings, and extending E.N.E. about $1\frac{1}{2}$ miles from the Diana shoal, is a bank with but 6 and 7 fathoms over it: to the southward of this bank are 9 and 10 fathoms, decreasing to 7 and 6 fathoms close to the Bintang shore. In the fair channel are 12 to 14 fathoms, and 16 to 20 fathoms towards the dangers near Pedra Branca. The depths in this channel are much greater to the westward of the meridian of Pedra Branca than upon or to the eastward of its meridian,

which ought to be kept in remembrance when passing through in the night.

Approaching the strait from the eastward 30 to 26 fathoms will be had at a distance of 40 miles from its entrance ; 26 or 24 fathoms at 30 miles ; and 22 to 20 fathoms at 20 miles, decreasing to 14 or 13 fathoms at 15 or 13 miles from Horsburgh lighthouse. At 10 miles eastward of the lighthouse the soundings become irregular, 9 to 14 fathoms, and continue to be so to within 4 miles of the lighthouse, when they deepen to 16 or 17 and soon to 18 or 19 fathoms ; close to the dangers near the lighthouse they are irregular, 9 to 14 fathoms.

Approaching the strait from the north-eastward, about 30 fathoms will be obtained at a distance of 40 miles ; 25 or 23 fathoms at 30 miles, decreasing to 16, 15, or 14 fathoms, at 16 or 17 miles, and then again deepening, regularly, to 18, 20, 24, 27, and 29 or 30 fathoms towards Horsburgh lighthouse, close to which are irregular soundings of 18 to 35 fathoms. A mile or two eastward of the Eastern bank the depths are 14 or 15 fathoms, and 16 to 18 fathoms from 1 to 4 miles eastward of the North patch. A mile or two from the Romania shoals the depths are 18 or 20 fathoms, shoaling to 16 or 14 fathoms near them.

In the Middle channel, between Horsburgh lighthouse and Romania shoals, the depths are very irregular, 17 to 35 fathoms close to the lighthouse, 19 to 30 fathoms in mid-channel, with some soundings of 14 and 15 fathoms rather nearer the shoals, close to which are 17 to 14 fathoms. In a line between the lighthouse and the Stork and other reefs off Romania point, there are 30 to 35 fathoms near the lighthouse, 19 to 21 fathoms in mid-channel, decreasing to 16 fathoms towards the reefs, close to which are 11 or 12 fathoms.

To the south-westward and westward of Pedra Branca, the soundings near it are 34 to 28 fathoms ; but there are some small banks W. by S. and W. by S. $\frac{1}{2}$ S. about 5 miles from it, with 10 to 17 fathoms water on them, and 20 to 30 fathoms around. From the Romania islands westward the strait is clear to Johore shoal, and the soundings are 18 to 25 fathoms in the fair track, rather more than mid-strait towards the northern shore, decreasing regularly to the latter. In mid-strait the depths are from 26 to 32 fathoms, decreasing to either side ; and the only dangers to be avoided in making long tacks are the Crocodile and Pan shoals, within the entrance of Rhio strait ; but they are out of the direct track of vessels proceeding through the strait of Singapore.

The TIDES * near Pedra Branca, and contiguous to the Romania reefs, are frequently very irregular in time, velocity, and direction. In the

* Horsburgh.

strength of the N.E. monsoon, when the current runs to the S.S.E. from Pulo Aor across the equator, the flood sometimes runs into the entrance of the strait to the south-west 10 or 12 hours at a time; but the ebb generally runs with the greatest velocity, and of longest duration, in both seasons, particularly in the S.W. monsoon. About the full and change of moon, the ebb often sets out strong during the night, for 10 or 12 hours together, but not very rapidly in the first and latter part: at other times it is changeable, and not strong. Between Pedra Branca and the edge of Romania reef the strength of the ebb runs generally about N.E. by N., when regular, and the flood in the opposite direction; but the tide has been sometimes observed to set all round the compass during the night, and once N.N.W. 2 miles an hour directly over the reef. About the northern patches of the reef the tides have also been found at times very irregular, setting East and West, and all round the compass; but their general direction in that part is nearly North and South, or within two points of the meridian. In the South channel, between Pedra Branca and Bintang, the flood sets about W.S.W. and W. by S., and the ebb in the opposite direction along the Bintang shore, but subject to irregularities.

On full and change of moon, it is high water at Pedra Branca about 11 hours, when any regularity is preserved by the tides. The velocity of the ebb, when strongest, is from 4 to $4\frac{1}{2}$ miles an hour in the entrance of the strait and between Romania point and Pedra Branca; but the flood is not so strong. The strength of the tides during the neaps is from 2 to 3 miles an hour, frequently very irregular.

In making Singapore strait, ships should always be prepared to meet with a current running to the southward in the N.E. monsoon, and to the northward in the opposite season, the strength of which is governed by the strength of the monsoon. In fine weather its rate is usually from $1\frac{1}{2}$ to 2 knots an hour, but the rapidity of the current is also accelerated or retarded by the local tides near the coast.

DIRECTIONS for the EASTERN PART of the STRAIT.—The Middle channel between Horsburgh lighthouse and the Romania shoals is the main entrance to Singapore strait from the eastward.* Although the South channel is still recommended in Horsburgh as being preferable for sailing through in the night, yet it is so encumbered with dangers, to clear which no good marks can be given, that it is seldom used by those accustomed to the navigation of the strait, more especially since the discovery, in 1861, of the Brakit rock off Brakit point, which is extremely dangerous to vessels standing out in the N.E. monsoon. The difficulty and danger

* Directions for the North Channel have been given at page 254.

attending the navigation of this channel arises from the risk of wrongly judging the distance from the lighthouse when endeavouring to keep clear of the South ledge. In making sure of being to the southward of this ledge, ships have frequently got too far over on the Bintang coast, and been lost upon some of the dangers there ; others have also been lost upon some of the dangers near Brakit point, in endeavouring to get out of the strait by this channel in the N.E. monsoon.

Coming from the eastward or north-eastward in the daytime, the entrance of Singapore strait may be easily recognized if the weather be fine and clear by Bintang Great hill, a remarkable Saddle hill (1,230 feet high) on Bintang island, and the sharp-peaked hill of Barbukit (645 feet high), on the opposite side of the strait. Bearings of these objects will serve to fix the vessel's position and guide her in shaping a course to sight the lighthouse. In making the entrance at night, if the vessel's position be known, it will be merely necessary to stand on boldly for the light, being careful to make a proper allowance for the set of the current, and when the light is seen, steer so as to pass about a mile to the northward of it. Vessels should not get within about 2 miles of the light until it bears to the southward of W.S.W., on account of the dangers lying off its east side. (See also foot note, p. 267.)

It is from the northward, however, that the strait is mostly made, (viz., by vessels coming from China), it being now the general custom for vessels from Europe to enter from Rhio strait. Horsburgh gives the following directions for ships to proceed from Pulo Aor to the entrance of the strait :—

During the strength of the N.E. monsoon the current sets generally to the southward or S.S.E., between Pulo Aor and the east end of Bintang, by which vessels running for Singapore strait in thick weather, are liable to fall to the southward of its entrance, if proper allowance be not made.

Departing from Pulo Aor, steer to bring it to bear about North when disappearing : if the weather be clear, Bintang hill and Pulo Aor may be seen together ; but this seldom happens. Do not bring the centre of Bintang Saddle hill to the eastward of South, until Horsburgh lighthouse is visible from the deck ; for with the hill bearing South the vessel will not pass far outside the North patch ; but it is a safe bearing if the compass be correct, and will lead down in soundings of 16 to 13 fathoms. Bintang Little hill, open to the westward of Bintang Great hill, leads to the eastward of the North patch.

In hazy weather Bintang hill is seldom visible until the Eastern bank is passed, in which case, having Pulo Aor disappearing about North, a course S. by W. to S.S.W. may be requisite to counteract the south-easterly current, or the ebb tide setting out of the strait to the

north-eastward. The depths will decrease regularly in steering southward, and the low land will *probably* be seen to the westward, when in 20 or 18 fathoms; if so, coast it along at 10 or 12 miles' distance, until False Barbukit *low sloping* hill is discerned, appearing a little way from the sea like a clump of trees more elevated than the others. When this hill bears W.S.W., 15 fathoms is the fair track; with it bearing W. $\frac{3}{4}$ S. and W. $\frac{1}{2}$ S., overfalls from 16 to 13 fathoms may be experienced, or probably less water, being then about the parallel of the North patch and the shoal patch, with 8 to 10 fathoms, on the Eastern bank.

Having coasted along at 10 or 12 miles distance, with the land distinctly in sight from the deck, and having brought False Barbukit hill to bear about W. by S., the vessel will be approaching the North patch; and with this hill bearing about W. $\frac{3}{4}$ S., if a cast of 10, 9, or 8 fathoms is got, but uncertain whether these soundings are on the North patch, or on the shoal patch of the Eastern bank, haul to the south-eastward until in 14 or 15 fathoms. Steer then South about 2 miles, or until False Barbukit hill bears West, when the vessel will be to the southward of the shoal patch of the Eastern bank, and abreast the North patch; she may then haul in to the W.S.W., and get a cast of 10 or 11 fathoms, and will then be certain that these soundings are on the outer edge of the Romain shoals, but in doing so, heave the lead quickly, and if there is less than 10 fathoms, haul out directly eastward into 15 or 16 fathoms, and then steer along the south-east edge of the shoals in 16 or 17 fathoms. If when the lighthouse is discerned, it bears S.S.W., the vessel will be clear to the eastward of the shoals; but if it is seen bearing S. by W., she will be close to or upon their edge. Having steered round the shoals so far as to bring the lighthouse S. by W., do not come under 16 or 17 fathoms in passing along their southern part; for they are there steep from 16 to 12, and from 12 to 3 fathoms at a cast, on some of the rocky patches, with the lighthouse bearing from S.E. $\frac{1}{2}$ S. to South. South island just open to the southward of South point, bearing about W. by S. $\frac{1}{2}$ S., leads clear to the southward of all the Romania shoals.

Although Pedra Branca rock is steep-to on the north side, it should not be approached very closely, for vessels are liable to estimate their distance from it sometimes greater than the truth; and, as the tide runs strong, they are in danger of being drifted quickly towards the rock without warning, if they borrow near it in light winds.*

* This remark of Horsburgh's should be carefully attended to; for several vessels have been very nearly set on this rock in light winds, and Horsburgh gives the following account of a vessel which was thus drifted upon it and lost:—"The *Shah Munchah*, a large and valuable ship from China, bound to Bombay, standing into the strait at mid-day, with a strong flood tide and scant wind, stood too near Pedra Branca before tacking, and was totally lost, by the tide setting her upon the rock whilst in stays."—J. W. Reed, Master, R.N.

Having passed between the Romania shoals and the lighthouse, and bound to Singapore roads, if the vessel be over on the north side of the channel, steer about S.W. or S.W. by W., if in mid-channel about W.S.W., and if near the lighthouse about W. by S., taking care if on the north side of the channel to have Tanjong Stapah open of South point, before South island, of the Romania group, is brought to the eastward of N. by E. Having brought the lighthouse to bear E. by N., the opposite course (W. by S.) will lead at a convenient distance from the north shore of the strait until Changhi point bears North, when steer half a point more to the southward ; the ships in the roads will be by this time in sight, and be a guide in approaching the anchorage, and as Tanjong Catong is neared, the flagstaff on Fort Canning hill overlooking the town should not be brought to the westward of W. by N.

If the tide is running to the westward it is the usual practice for vessels to keep well over on the north side of the channel, especially in light winds, for neglecting this precaution they have often been swept by the rapid current past Singapore roads and the St. Johns islands—the deep water, 45 or 50 fathoms, rendering it difficult or impossible for them to anchor—into the western part of the strait. In doing this, however, they must be cautious not to get too near the Johore shoal, which will be avoided by keeping South Romania island open of South point, or South point to the northward of E. by N. $\frac{1}{2}$ N.

At NIGHT keep a good look-out for Horsburgh light, (page 242,) which being visible in clear weather at 15 miles, will be in sight before the vessel can get too near the dangers at the entrance of the strait.

If entering the strait from the southward or south-eastward, the light is seen bearing to the southward of West, a course may be shaped to pass about 2 miles to the northward of the light, proper care being observed to allow for the set of the tide, so that the light is not neared under 2 miles, on a West or N.W. bearing, to avoid the dangers extending to the east and south-east from it. Should the light when first seen bear about W. by N. or W.N.W., a vessel will be within 2 or 3 miles of the Brakit rock, over which there are but 2 fathoms water, and from which the light bears W. by N. $\frac{1}{2}$ N. $12\frac{1}{4}$ miles.

If when entering from the northward the light is made bearing anything to the southward of S.S.W., haul to the eastward until it bears S.S.W. which will lead outside the North patch ; approach the light upon this bearing until about 2 miles from it, when a W.S.W. course may be shaped until the light is brought E. by N., when keep it on that bearing, steering W. by S. until the light is lost sight of.

Continuing for 4 or 5 miles farther on a W. by S. course after Horsburgh light has disappeared, the fixed light at Singapore will soon come

in sight, but in case it should not be distinctly made out* by the time Johore hill bears N. by E., do not come under 16 or 17 fathoms towards Johore shoal, and if a cast of 12 or 11 fathoms should be had haul quickly to the southward, for this shoal is steep, and should not be approached under that depth. Be careful not to mistake Singapore light, which will be seen some distance above the horizon when first discerned, and high above the lights of the shipping and town as the roads are neared; when plainly seen it may be approached on a West bearing until the eastern extreme of Singapore island (Changhi point) bears North, or Johore hill bears N.E. $\frac{1}{2}$ E., when the light should be brought to bear W. $\frac{1}{2}$ N.; as Tanjong Catong is approached, edge to the southward until the light is to the northward of W. by N.

It is very necessary to observe the precaution of keeping on the north shore of the strait when nearing Singapore roads at night, for although a vessel may have entered the strait with a strong N.E. monsoon, yet as she nears the roads, the wind will, in the night, generally draw off the land from the north-westward, making it always very difficult and sometimes impossible to fetch into the roads or get into a convenient depth of water for anchoring.

If bound into the strait of Malacca, a W. by S. $\frac{1}{4}$ S. course is the fair mid-channel track from Horsburgh lighthouse, and when within 5 miles of St. Johns island the Raffles *fixed* white light on Coney island, will be distinctly seen. A vessel should steer up pretty close to St Johns island, avoiding the south side of the strait, and proceed through the western part of the strait according to the directions give at page 298; the Raffles light bearing W.S.W. is the fair channel mark.

THE SOUTH CHANNEL is sometimes convenient for ships which fall to leeward of Horsburgh lighthouse during thick weather, as they have no occasion to anchor outside. If the wind be north-easterly, they may run down until within 4 or 5 miles from the Bintang shore, remembering that Barbukit hill must be kept four times its own breadth open northward of Horsburgh lighthouse, or the lighthouse kept westward of W. by N. $\frac{1}{2}$ N. to clear the Brakit rock, then haul to the westward, and pass nearly in mid-channel between the shore and the lighthouse in 11 to 13 fathoms of water. With the wind* at N.W. or North, it will be advisable to borrow nearer to the South ledge than to the Bintang shore, observing not to

* This light was, until very lately, very difficult to be made out by strangers, and was seldom discerned until the lights of the shipping or town had been some time in sight. It is merely a large lantern hoisted upon a flagstaff, but the power of the light has been recently increased by the application of "intensifiers" and is now said to be visible 15 miles.

approach too closely to the South ledge, as it is covered at half-tide. By borrowing towards the weather side of the channel, vessels will be enabled to reach well into the entrance of the strait; and if the wind is scant and the tide against them, they will have smooth water and good bottom for anchorage, until the tide of flood is favourable for proceeding to the westward.*

A detailed description of the dangers and bearings to clear them have been given at pages 242 to 248, to which the navigator is referred in case he determines to use this channel, which it would not be advisable to do unless under the circumstance of finding his vessel too far to leeward to fetch into the strait to the northward of Horsburgh light. Neither does there seem to be any advantage in using this channel when leaving the strait; it is much better to keep to the northward in the N.E. monsoon, as close as possible to the Romania islands, and stand out through the Middle channel.

To work through the Eastern Part of the Strait.—No difficulty will be experienced by strangers in working in either direction through the eastern part of the strait. The most prudent plan is to keep towards the north shore, as the depths are more convenient for anchoring on that side of the strait, in case of having to bring up. A vessel should tack towards the Romania shoals, when South island is seen opening to the southward of South point; and when standing towards Stork reef and Congaltons Carr, South point should not be brought to the southward of W. $\frac{1}{2}$ S. When South island bears to the eastward of North, Tanjong Stapah must not be shut in behind South point when standing to the northward; and from thence the shore may be approached into 12 or 11 fathoms. South island kept open of South point leads to the southward of Johore shoal, and when standing towards this danger, if these objects cannot be seen, avoid coming under 17 or 16 fathoms, and on no account under 12 or 11 fathoms, for the shoal is steep. From Johore shoal to Singapore roads the shore may be approached to 12 or 11 fathoms; but it is not prudent to go into a less depth.

There are no dangers on the south side of the strait, excepting those fronting the Bintang coast and the Crocodile and Pan shoals, &c. But a vessel should not stand so far over as to get near these dangers, for no advantage will be gained by doing so, and the depths there are inconveniently great for anchoring. Pulo Nongsa, a remarkable little island, with a high tree upon it, lying just to the westward of the entrance to Rhio strait, is very convenient for taking bearings of when getting over

* Horsburgh.

to the southward near Rhio strait, and if kept to the southward of West, will lead clear of all danger at the entrance of that strait.

TO PROCEED from SINGAPORE ROADS to the EASTWARD.—On leaving the roads steer about E. by S. until past Tanjong Catong, when a course may be shaped about East, and by not bringing the flag-staff on Fort Canning to the southward of West as long as it remains in sight, it will lead well clear of Johore shoal. When Johore hill bears North, the vessel will be westward of Johore shoal, and may steer E. by N. for the lighthouse, and passing about a mile to the northward of it, proceed to sea as convenient.

SINGAPORE TOWN AND ROADS: NEW HARBOUR.

SINGAPORE.—The town of Singapore is built on each side of the Singapore river, a small stream, only navigable for boats, the entrance of which lies W. by S. $\frac{1}{4}$ S. nearly $2\frac{1}{2}$ miles from Tanjong Catong, and N. by E. $\frac{3}{4}$ E., nearly a mile from Malay point. The commercial part of the town is on the south side of the river, the bank on that side being lined with quays and godowns for the landing and reception of merchandise. The river is usually crowded with cargo boats and many other descriptions of small craft on their way to and from the ships in the harbour, presenting a scene of extraordinary bustle and activity. Singapore is a free port; there are no harbour or tonnage dues.

Fort Fullerton is the name given to a small battery which stands on the southern part of the entrance to Singapore river. It is important from being the point to which it has been customary of late years to refer the meridian distances* obtained in Her Majesty's surveying and other ships employed upon the station. A handsome line of godowns is in course of erection to the southward of the Fort, upon some land which has been reclaimed from the sea for that purpose. These buildings will very much improve the sea front of the town, and will be conspicuous as it is approached from the eastward.

The principal landing place is at the Dalhousie pier, a structure of stone and wood on the northern side of the entrance to the river, projecting over the flat which extends from the shore some distance to seaward. An obelisk stands near the inner end of the pier, and around it are *four red* lights, which serve to point out the position of the landing place at night. A *white* light is shown on the outer end of the pier. Close to the left of

* The latitude and longitude of Fort Fullerton now used is $1^{\circ} 15' 50''$ N., and $103^{\circ} 51' 18''$ E. The longitude has not yet been absolutely determined, but the above, which is derived from the records of many meridian distances deposited in the Hydrographic office of the Admiralty, is believed to be very near the truth.

the obelisk, (as viewed from seaward,) are two fine buildings; the one standing back is the court house, and that nearer the sea, the town hall. Farther to the left is the post office, a very mean looking building, and still farther to the left, on the bank of the river, is the office of the master attendant.

On the right of the obelisk, the esplanade, a grass enclosure surrounded by a carriage drive, extends along the sea front for the distance of a quarter of a mile, and the drive round it is the fashionable resort of the European residents in the cool of the evening. Behind the esplanade are three large buildings, the two farthest to the left are used as hotels, and the third is the masonic hall. To the right of these buildings stands St. Andrews church, one of the finest ecclesiastical structures in India, built after the model of Netley Abbey; the church has a fine tower, surmounted by a lofty spire, which is very conspicuous when viewed from seaward. To the right of the church is a very large building, the Raffles Institution; extending from which in the same direction are a number of handsome detached houses, standing in gardens. Beyond this line of houses, is an extensive native town, the greater part of which is hidden by the sandy point, named Tanjong Rhoo.

The above is a brief description of the most prominent objects seen along the shore of Singapore bay, when viewed from the anchorage.

Imports and Exports.—The free port of Singapore, which now ranks as the third port in the commerce of India, was founded in 1819 by Sir Stamford Raffles, who had the sagacity to perceive that from its central geographical position, on the direct route between India and China, and but 40 or 50 miles out of the direct route between Europe and China, it could not fail to become a place of great commercial importance. The rapid growth of Singapore has, however, exceeded all expectation, and the following statistical accounts have been extracted from a recently published work* to give, as briefly as possible, a general idea of the magnitude and character of the trade of this important settlement :—

	1833.	1843.	1853.	1863.
Imports -	£2,043,000	£2,953,000	£3,488,000	£6,462,000
Exports -	1,705,000	2,595,000	3,027,000	5,555,000
Total -	<u>£3,748,000</u>	<u>£5,548,000</u>	<u>£6,515,000</u>	<u>£12,017,000</u>

The chief imports are :—

From Europe and North America : Treasure, cotton manufactures, woollens, beer and wines, arms and ammunition, iron and ironwork,

* Our Tropical Possessions in Malayan India, 1865, by Jno. Cameron, F.R.G.S.

copper and yellow metal, lead, earthenware, canvas, &c., miscellaneous.

From Calcutta : Opium, grain, saltpetre, gunnie bags.

From China : Gold bars and dust, sycee silver and dollars, china cash, sugar, tea, camphor, cassia, alum, raw thread silk, tobacco.

From the Dutch ports in Java, &c. : Treasure, tobacco, rice, pepper, gambier, coffee, cottons, birds' nests, cloves, cassia, cinnamon, other spices.

From Borneo : Unprepared sago, antimony ore, rattans, gutta percha from Sarawak, and coals from Labuan.

From Celebes : Sandal-wood, sapan-wood, coffee and gutta-percha, the products of the island, and of mother of pearl, bartered for with the natives of New Guinea and other islands to the south-east of the Archipelago. Birds' nests and a small quantity of bees-wax also form items of importation from Celebes.

From Sumatra : Pepper, sago, coffee, gutta-percha, gum benjamin, gum elastic, and ivory.

From the Malayan peninsula : Chiefly rice, gutta-percha and tin ; small supplies of ivory, horns, hides, and birds-nests.

From Australia : Chiefly horses, bread-stuffs, coals from the mines at New South Wales, and sandal wood from Western Australia.

The chief articles of export are : — Gambier, tin, sago, tapioca, black pepper, tortoise shell, mother of pearl, gutta-percha, nutmegs and mace, camphor, white pepper, gum elastic, coffee, sapan wood, sticklac, rattans ; and most of the articles enumerated among the imports.

Shipping.—From the 1st of May 1862 to the 30th of May 1863, 1,279 square-rigged vessels of 471,441 aggregate tonnage, arrived at Singapore. Of the junks and trading prahus which frequent the port, no very reliable records are kept ; but about 200 arrive annually, and it is estimated that they carry about an eighth part in value of the yearly trade.

Revenue.—The total amount of the revenue from all sources between the 1st May 1863 and 30th April 1864, was 191,909*l*.

The Population of Singapore may be set down roughly at 90,000. The last census, necessarily in such a country a very imperfect test, made it to be 84,000. It is made up of the following elements : Malays, 13,500 ; Chinese, 58,000 ; Natives of India, 12,700 ; Other Asiatics, 6,500.

SINGAPORE ROADS are on the southern side of Singapore island, their limit being defined by a line drawn from an obelisk on Tanjong Catong to another on the south-east extreme of West St. Johns island. The usual anchorage, however, for ships taking in and discharging cargo, and which is generally known as Singapore harbour, is restricted to that part of the roads comprised within the limits defined by a line drawn from Malay point

in an easterly direction, until it meets the line drawn between Tanjong Catong and West St. Johns island, and which includes a space about one-third of the extent of the entire roads.*

TANJONG CATONG, or Deep-water point, forming the north-eastern boundary of Singapore roads, is $3\frac{1}{2}$ miles W.S.W., from the small Red cliffs. An obelisk, which marks the harbour limit in this direction, stands about a cable's length to the westward of the round of the point. The coast, nearly all the way from the small Red cliffs to Tanjong Catong and for some distance to the westward of it, is low land, covered with cocoa-nut plantations.

SAND-BANKS.—Lines of fishing stakes run out from the coast about Tanjong Catong, over the shallow bank extending from the coast, and close to the ends of the stakes are 6 and 7 fathoms water, but these soundings are in a narrow run of deep water, behind the harbour bank, the 5-fathoms line at the edge of which is about three-quarters of a mile distant from the point.

Between the deep water close to the point, and the 5-fathoms line outside of it, are several patches with but $2\frac{1}{2}$ and $2\frac{3}{4}$ fathoms water over them, and two patches with as little as 2 fathoms. One of the latter lies S.E. by E. $\frac{1}{2}$ E. from the obelisk, distant half a mile from the shore nearest to it; and the other S. by W. $\frac{1}{2}$ W. nearly three-quarters of a mile from the obelisk.

These shoals will be avoided by keeping Mount Serapong westward of S.W. by W. $\frac{1}{2}$ W. until the flagstaff on Fort Canning bears W. by N. $\frac{1}{2}$ N.; or by not shoaling under a depth of 6 fathoms towards them.

TANJONG RHOO, or Sandy point, is the extreme of the land extending $1\frac{1}{4}$ miles West from Tanjong Catong, and forming the northern shore of Singapore bay. It bears N.E., a little over three-quarters of a mile from the entrance of Singapore river, and is separated from the western shore of the bay by a channel a quarter of a mile wide, in which there are but 3 to 7 feet water at low spring tides.

Inside Tanjong Rhoo is an extensive shallow lagoon, convenient for the anchorage of boats and native craft, and very many such are to be seen there at certain seasons. Some shipwrights' yards are now established at this point, and many small vessels go there to be repaired.

FORT CANNING.—Rising abruptly behind, and overlooking the town of Singapore, is a hill 156 feet high, upon which formerly stood a large

* See charts:—Singapore Roads, No. 1,995, scale, $m = 6$ inches; and Strait of Singapore, sheet II., No. 2,403, scale, $m = 0.65$ of an inch.

bungalow, the residence of the governor ; now, however, the crest of the hill is covered by a large fort, which has been named Fort Canning, in honour of the late Viceroy of India. Near the middle of the fort is a flagstaff, crossed with two yards, which is used during the day to signal the arrival of ships.

LIGHT.—A *fixed* white light is exhibited from the flagstaff in Fort Canning, at an elevation of 226 feet above the level of the sea, and in clear weather it is said to be visible at 15 miles (*see* foot note, page 269).

SHORE FLAT.—A mud flat fronts the whole shore of Singapore bay from abreast of Tanjong Catong to Malay point. In front of the esplanade it extends rather more than a cable's length, in front of Fort Fullerton and the new godowns, not more than half a cable, but in the bay to the southward, towards Malay point, its distance from the shore is nearly 2 cables.

MALAY or MALANG POINT, the south-western limit of Singapore bay, bears S.W. by W. $\frac{1}{4}$ W. nearly 3 miles from the obelisk on Tanjong Catong, and S. by W. $\frac{3}{4}$ W. nearly a mile from the entrance of Singapore river. The land from Malay point takes a south-westerly direction for nearly half a mile to Pagar point, and then trends to the westward, forming the northern shore of New harbour.

MALAY and PAGAR SPITS.—A mud and sand flat, with several patches of rocks upon it, and which dries at two-thirds ebb, fronts the small bay between Malay point and Pagar points, projecting in a southeasterly direction, to the distance of a third of a mile. That part of the bank which extends from Pagar point is known as Pagar spit, and that extending from Malay point as Malay or Malang spit. Shoal water, under 3 fathoms, extends some distance outside the flat, and its edge is marked by several lines of fishing stakes.

BLAKAN MATI ISLAND lies to the southward of the southern part of Singapore island, from which it is separated by a channel now known as New harbour. The island is 2 miles long W.N.W. and E.S.E., and a mile broad at its eastern extreme, but its western end terminates in a point. It is fringed by a reef, which from Berala point, its north-eastern extreme, projects a quarter of a mile to the eastward ; this part of the reef is known as Berala spit, and from its outer part Berala point bears W. $\frac{3}{4}$ S., and the hill over Pagar point N. $\frac{1}{4}$ W. ; from thence it trends about S. by W. for the eastern extreme of the island, from which it projects but a short distance. Off the south point of the island the shore reef extends about three-quarters of a cable's length, and about the same distance along its west side ; but a small, detached reef, named Pelawan about $1\frac{1}{2}$ cables in extent, lies 2 cables' lengths off the west shore of the island, nearly midway between its southern and western extremes.

MOUNT SERAPONG, rising to the height of 302 feet near the north-eastern extreme of Blakan Mati, is conspicuous when approaching Singapore roads from the eastward, and will assist a stranger in making out the land, St. Johns islands being seen to the southward of it. There are several other hills of less height than Serapong upon Blakan Mati, but they are more observable in coming from the westward, when they will be seen under the higher land of Singapore island.

Over Rimau point, the west extreme of the island, is Mount Siloso, 170 feet high, to the eastward of which, and south from Berdaun rock, is Mount Imbeah, 202 feet high. South-eastward from Imbeah is a hill 168 feet high, westward of which is another 160 feet high.

BURAN DARAT is the name of an extensive coral reef—which uncovers at two-thirds ebb, and fronts the eastern shore of Blakan Mati island, being separated from the shore reef by a narrow channel, with depths of 4 to 8 fathoms in it. The reef is about a mile long, N.E. by N. and S.W. by S., a quarter of a mile broad at the northern end, and terminates in a point at its southern extreme. There is a detached patch with $1\frac{1}{2}$ fathoms on it, and $3\frac{1}{4}$ to 4 fathoms close around, lying about a cable's length to the northward of the north edge of the reef; but Teregeh point bearing W. $\frac{1}{2}$ S. will lead to the northward both of this patch and Berala spit.

The north-eastern extreme of Buran Darat is marked by a *white beacon*, from which Berala point bears W. $\frac{1}{4}$ N., distant nearly two-thirds of a mile, and the hill over Pagar point N.N.W.-westerly.

ST. JOHNS ISLANDS, three in number, form the south-western limit of Singapore roads. They lie about N.E. by E. and S.W. by W. from each other, extending nearly a mile in those directions.

Peak island, or Pulo Tambakool, the north-easternmost of the three, is a mere islet rising to a peaked hill 101 feet high. From its western part a low, narrow, sandy neck extends, on the extreme of which is a small mound, which at some little distance appears like a separate islet. The island is encompassed by a reef which extends from it about three-quarters of a cable's length in a southerly and south-easterly, but 2 cables' lengths in a north-westerly direction.

The middle island, known as East St. Johns island, is about half a mile long N.W. and S.E., a quarter of a mile broad, 189 feet high, and sloping in form. It, also, is surrounded by a reef which extends a little over half a cable's length from its south point, and $1\frac{1}{4}$ cables from its south-eastern shore.

West St. Johns island is rather larger than East St. Johns, but not quite so high. Its south-east extreme is joined to the main body by a

narrow neck of lower land, which at a little distance gives it the appearance of a separate islet. A reef extends about a third of a cable's length from its southern and western sides, and $1\frac{1}{2}$ cables from its eastern side.

Between these islands are narrow channels about half a cable wide, with depths of 6 to 16 fathoms in them.

Close to the eastern side of the reef surrounding Peak island are 6 to 8 fathoms, with a run of deep water, 21 to 23 fathoms, at 2 cables' lengths from it in that direction, decreasing to 14 and 12 fathoms a little farther to the eastward. Close to the southern side of the reefs fronting the East and West St. Johns islands are 9 or 11 fathoms, deepening to 22, 24, 26, or 30 fathoms, at 1 to 2 cables' lengths. The west side of West St. Johns island is bold close to, there being 16 or 17 fathoms at less than half a cable's length from it.

ISLANDS and DANGERS.—In the space between Blakan Mati and St. Johns islands are a few small islands and several extensive reefs. Between the latter are channels of deep water, but they are so narrow and intricate as to be useless for the purposes of ordinary navigation.

Pulo Sikookur, about half a mile long N.W. by N. and S.E. by S., but very narrow, lies nearly mid-channel between West St. Johns and Blakan Mati islands.

Pulo Ringat is the easternmost of two small islets which lie close to the north-eastward of St. Johns islands.

Clearing Marks.—To avoid all the dangers between St. Johns islands and Malay point, Peak island must not be brought to the eastward of S. $\frac{1}{2}$ E., when Mount Serapong bears to the northward of W.N.W. When Mount Serapong is to the westward of W.N.W., a vessel may stand on until the western extreme of West St. Johns island bears S. by W. $\frac{1}{2}$ W., but no farther.

OUTER BANK and SHOAL.—A mud-bank, with general depths of 10 to 4 fathoms over it, extends across the outer roads of Singapore, from the St. Johns islands to abreast of Tanjong Catong, where it takes the direction of, and fronts the coast some distance to the north-eastward.

The least water on this bank is about the middle of it, and it is this part which is generally known as the Outer shoal, which is $1\frac{1}{2}$ miles long N.E. and S.W., a cable broad at its northern, and nearly half a mile broad at its southern end, having depths of 4 to $4\frac{1}{2}$ fathoms over the greater part of it, but some patches of $3\frac{1}{2}$ and $3\frac{1}{2}$ fathoms near its southern extreme.*

* This bank is shoaling rapidly. In 1846, when surveyed by Mr. Thompson, Government surveyor, the general depths upon it were $5\frac{1}{2}$ and 6 fathoms, and the least water $4\frac{1}{2}$; now the general depths are but 4 and $4\frac{1}{2}$ fathoms, and the least water $3\frac{1}{2}$ fathoms.

From the north-east end of the shoal, in 5 fathoms, the obelisk on Tanjong Catong bears N. $\frac{3}{4}$ E., Fort Canning flagstaff is just to the northward of the obelisk on the Dalhousie pier N.W. by W. nearly, and Peak island bears S.S.W. $\frac{1}{2}$ W.; from its south-eastern extreme Fort Canning flagstaff bears N.N.W. $\frac{1}{4}$ W., and Peak island S. by W. $\frac{1}{2}$ W.; and from its south-western extreme the same flagstaff bears N.N.W., and Peak island S. $\frac{1}{4}$ W.

Fort Canning flagstaff open northward of Dalhousie pier, bearing N.W. by W. $\frac{1}{4}$ W., will lead clear of the north end of the Outer shoal; Peak island S.W. by S. will lead eastward of it; and the southern extreme of Blakan Mati island S.W. by W. $\frac{1}{2}$ W. will lead westward.

North-eastward of the Outer shoal the bank is not quite three-quarters of a mile broad, with depths of 6, 7, and 8 fathoms over it. South-westward of the Outer shoal the soundings on the bank are not so regular, and a hole of deep water half a mile long runs into the bank in a north-westerly direction about three-quarters of a mile from St. Johns islands.

A small patch, about 2 cables in extent, having 4 fathoms least water over it, lies about a third of a mile south-westward of the Outer shoal, and from its centre Fort Canning flagstaff bears N.N.W.-northerly. Peak island S. $\frac{3}{4}$ W., and Mount Serapong W. by N. $\frac{1}{4}$ N. Mount Serapong bearing W. $\frac{3}{4}$ N. leads between this patch and the Outer shoal, and bearing W. by N. $\frac{3}{4}$ N. leads to the southward of it.

Peak island bearing S.W. leads just outside the 10-fathoms line at the edge of the bank in from 11 to 13 or 14 fathoms; the soundings quickly deepening to 17, 20, 25, and 30 fathoms south-eastward from the middle and southern part; and to 17 and 20 south-eastward from the northern part of the bank.

Inside the Outer shoal are 10 to 12 fathoms, mud, decreasing gradually to 7 or 6 fathoms, but shoaling suddenly from a depth of 5 to 4 or 3 fathoms, when Fort Canning flagstaff bears to the northward of N.W. by W. $\frac{1}{2}$ W., demanding caution in large ships anxious to get as close in as possible. With Fort Canning flagstaff to the westward of N.W. by W. $\frac{1}{2}$ W., the soundings decrease much more regularly. The 2-fathoms line extends nearly half a mile south-eastward of Fort Fullerton, and nearly three-quarters of a mile from the depth of Singapore bay. The extremity of the north-eastern line of fishing stakes marks the 3-fathoms edge of the shore bank, eastward of Malay point.

Near the north-eastern extreme of the Buran Darat reef, is a run of deep-water—12 to 23 fathoms—which terminates about half a mile E.S.E. from Malay spit.

ANCHORAGE.—The trade of Singapore is now so considerable that a large number of vessels are always to be found anchored in that part of

the roads called the harbour, and small vessels may run in, guided by their soundings, and anchor where they can find a convenient berth.

Vessels of large draught must be more cautious, on account of the soundings decreasing suddenly from 5 to 4 and 3 fathoms. Good, safe anchorage, in from 7 to 10 fathoms water, will be found with the flagstaff on Fort Canning between the bearings of W. by N. $\frac{1}{2}$ N. and N.W. $\frac{1}{2}$ N., and with Mount Serapong bearing S.W. by W. $\frac{1}{2}$ W., or the left extreme of Blakan Mati S.W. $\frac{1}{2}$ W.; the latter bearing places a ship a little farther in, and is useful when the flagstaff is to the westward of N.W. by W.

The most convenient anchorage for a large man-of-war—the ship of the senior naval officer for instance—and the nearest to the shore, is with the flagstaff on Fort Canning in line with the obelisk on the pier, and the left extreme of Blakan Mati island bearing from S.W. $\frac{1}{2}$ W. or S.W. $\frac{1}{4}$ W.—but nothing to the southward of the latter bearing; or the obelisk on Tanjong Catong from N.E. by N. to N.E. $\frac{3}{4}$ N.—but nothing to the eastward of the latter bearing. She will then be in 9 fathoms, but only a little more than 2 cables' lengths from the 3-fathoms edge of the bank, not quite $1\frac{1}{2}$ miles from the landing place, and in a good position for boarding new arrivals, &c.

DIRECTIONS.—Small vessels bound to Singapore roads from the eastward will have no difficulty, as they have merely to proceed to a convenient anchorage. Those drawing between 12 and 16 feet may pass inside the shoals off Tanjong Catong, by keeping in the run of deep water, pretty close to the end of the lines of fishing stakes which extend out from the point; but vessels of larger draught had better keep outside those shoals.

It is often advisable for vessels, and the usual custom for those belonging to the port, to keep the Singapore shore well aboard when proceeding to the anchorage from the eastward, especially when the wind is off the land and the tide setting to the westward. It will then, however, be very necessary to be guarded as Tanjong Catong is approached, and vessels of large draught must be very careful not to bring Mount Serapong (on Blakan Mati island), to the southward of S.W. by W. $\frac{1}{2}$ W., until the flagstaff on Fort Canning bears W. by N. $\frac{1}{2}$ N., or to avoid getting under a depth of 6 fathoms towards the Tanjong Catong shoals.

A vessel of large draught will pass north-eastward of the Outer shoal, and not have less than 5 fathoms water, by keeping the flagstaff between the bearings of W. by N. $\frac{1}{2}$ N. and N.W. by W., and she should be prepared to anchor *directly* Mount Serapong bears S.W. by W. $\frac{1}{2}$ W., or the left extreme of Blakan Mati S.W. $\frac{1}{2}$ W., inside of which vessels of heavy draught should not go; but those drawing not more than 18 or 20 feet may go a cable's length or so farther in, and have 4 or 5 fathoms.

When bound to the roads from the westward, and having rounded Peak island at the distance of about 2 cables' lengths, steer N. by E. or N.N.E. according to the tide, across the Outer shoal for the anchorage. A large ship wishing to avoid the Outer shoal may steer to the northward with Peak island bearing between South and S. by E.,—but nothing to the eastward of the latter bearing,—until the left extreme of Blakan Mati bears S.W. by W. $\frac{1}{2}$ W., which bearing kept on will lead north-westward of the Outer shoal, and then steer as convenient for the anchorage.

In working towards the dangers between St. Johns islands and Blakan Mati, care must be observed not to bring Peak island east of S. $\frac{1}{2}$ E. while Mount Serapong is north of W.N.W.; but when Mount Serapong is west of W.N.W., a vessel may stand on until the western extreme of West St. Johns island bears S. by W. $\frac{1}{2}$ W. The shoalest spots on the Outer shoal will be avoided by not bringing Peak island west of South, after the south extreme of Blakan Mati bears W. by S. The fishing stakes will give warning when a vessel is standing towards the Pagar and Malay spits. The south extreme of Blakan Mati, if not brought west of S.W. by W. $\frac{1}{2}$ W., will lead clear of the inner side of the Outer shoal; and large ships, not wishing to stand over this shoal when outside of it, should not bring Peak island south of S.W. by S.

SINGAPORE NEW HARBOUR AND THE SINKI CHANNEL.

New harbour, the name given to the channel between Singapore and Blakan Mati islands, is about $2\frac{1}{4}$ miles long, in a general direction East and West, but the main channel takes a somewhat serpentine course; the breadth of the harbour is not more than $1\frac{1}{2}$ cables in several places. The eastern entrance is bounded on the north by the Malay and Pagar spits, and on the south by Buran Darat reef, and the reefs surrounding the eastern sides of Blakan Mati and Ayer Brani islands.*

As an anchorage New harbour is but a very indifferent one indeed, for the breadth of the navigable channel is but from 100 to 200 yards, the bottom is rocky and foul, and affords but bad holding ground, whilst the tides rush through it with great velocity; there is, from these circumstances, great risk of vessels dragging their anchors and going ashore, especially during the violent squalls which are common in this part of the world.

Notwithstanding these serious drawbacks, New harbour has, within the last few years, grown into a place of considerable importance, for it possesses facilities for running out jetties and making docks, which render it of the highest possible value to a large shipping port like Singapore, situate in the very centre of Eastern commerce. The Peninsular and

* See Plan of New Harbour, No. 2,023; scale, $m = 12$ inches.

Oriental Company, together with other steam proprietors and merchants, have erected extensive coal stores, wharves, and jetties, the latter allowing of the largest steamers being lashed alongside in perfect security. It is the place of arrival and departure of the mail steamers, and all other steamers, no matter how large, proceed here to coal. There is a capacious dry dock, large enough to take in two vessels at once, with engine house, workshops, and all needful appliances for repairing ships; and another dry dock is now in progress, which is intended to have sufficient depth of water over the sill, and to be extensive enough to take in the largest of H.M.'s frigates.

The whole of the above establishments are situated on the north or Singapore side of New harbour, but the English and French Governments have coal wharves and jetties on Pulo Ayer Brani, an island lying in the middle of the eastern entrance to the harbour, and dividing it into two channels.

Both sides of the harbour are fringed with reefs which dry at low water, but close to their edges are depths of $3\frac{1}{2}$ to $4\frac{1}{2}$ fathoms, increasing quickly to 5 and 6 fathoms, and to this circumstance New harbour owes its importance. The deep water at the edges of the reefs allowing the largest vessels to come alongside, it is but a simple matter to run out jetties to secure the vessel to. These jetties, of course, greatly facilitate the coaling of steamers and landing of cargo, which, at the anchorage in the roads, can only be done by means of boats.

Docks.—The following are the dimensions of the docks above-mentioned :—Cloughton's dock, already made; length 420 feet, breadth 43 feet, depth over sill $15\frac{1}{2}$ feet. Tanjong Pagar dock, now in course of construction; length 400 feet, breadth 64 feet, depth over sill 21 feet.

NORTH SIDE OF NEW HARBOUR.—Pagar spit, which forms the north-eastern limit of New harbour, extends about S.S.E. $\frac{1}{2}$ E. a third of mile from Pagar point, and its extreme is marked by a *red* beacon, and there is another at a cable's length to the north-westward of it. From the first beacon the edge of the reef trends in a north-westerly direction about 3 cables' lengths, where it curves round and takes a westerly direction for rather more than half a mile. The edge of this latter part of the reef is marked by two *fixed white* beacons, and close to it are depths of $3\frac{1}{2}$ to 5 fathoms. The edge then trends about S.W. by W., and for a distance of nearly a quarter of a mile is lined with a row of jetties with coal stores and godowns behind them. At a cable's length farther to the south-west, on the other side of a shoal bight named Blangah bay, is St. James hill, 70 feet high, having a house and some trees on its summit, and which is a beautiful feature in the delightful scenery of this harbour. It juts out from the main—to which it is connected merely

by a low, narrow neck—close to the edge of the reef, which is there marked by a *red beacon*. Mooring buoys, painted red, are placed off the jetties, to assist in securing the steamers when coaling.

From St. James hill the edge of the reef takes a westerly direction, and at a cable's length from the hill, on the other side of a shoal bight, named Sibet bay, commence the jetties of the Peninsular and Oriental Company, with extensive coal stores and godowns behind them. The whole of these buildings are on ground that was once a small island, but which is now connected to the main island of Singapore by a roadway. The entire frontage of the jetties is about $1\frac{1}{2}$ cables in extent. A *red beacon* marks the edge of reef between St. James hill and the jetties, and at either end of the jetties is a dolphin to secure vessels to, with two mooring buoys off in the stream for the same purpose.

From the western end of these jetties, the edge of the reef takes a W. by N. direction for $3\frac{1}{2}$ cables' lengths, a *red beacon* marking it about half-way; it then turns sharply to the north-west, and at about the distance of $1\frac{1}{2}$ cables is the dry dock and works previously alluded to. From the dock the reef curves round to the westward, forming Chermin bay; it then takes a south-west direction for about $1\frac{1}{2}$ cables, when it again curves to the westward and then to the southward, forming another small bay, and finally passes about a quarter of a cable's length round Lots Wife, at the north-western limit of the harbour. This latter small bay is nearly filled up by shoal water, and practically the reef may be considered to extend from the foot of Mount Chermin straight to Lots Wife.

Kantu, the small round island lying in front of Chermin bay, is nearly $1\frac{1}{2}$ cables in diameter, 96 feet high, and covered with trees. Its southern side, being nearly in the same line as the Peninsular and Oriental jetties and Lots Wife, forms part of the northern side of the main channel of the harbour. A reef surrounds the east, south, and west sides of the island, the edge of which on the south side is marked by a *white beacon*. The north-east side, opposite the dry dock, is free from reefs, with 3 fathoms water close to. On the east side of the island is a ship yard, with a patent slip for vessels under 200 tons.

BERLAYER POINT, the north-western limit of New harbour, is formed of cliffs of moderate elevation, and projects in a S.S.E. direction from the low mangrove behind it to a rather sharp point. From this point the coast trends in a north-westerly direction, and is fringed with a white beach named Pasir Panjang, or long beach, upon which, at a cable's length from Berlayer point, stands a board, denoting the harbour limit in this direction.

Lets Wise is a rock about 6 feet above high water, lying immediately off the pitch of Berlayer point, about a third of a cable's length inside the edge of the shore reef, which is here steep-to. This rock was formerly much higher, and had the appearance of a pillar, hence its name.

Berlayer Rock, with but $1\frac{1}{2}$ fathoms water over it, lies S.W., rather more than half a cable's length from Berlayer point. H.M.S. *Charybdis* touched upon this rock; it is now marked by a *beacon*.

A Patch having but $3\frac{1}{2}$ fathoms water over it, lies West-southerly, a quarter of a mile from Berlayer point. It is the shoalest part of a bank over the greater part of which are 4 and 5 fathoms water, with 7 and 8 fathoms close to its outer edge, and 6 fathoms between it and the shore reef fronting Pasir Panjang beach.

To clear this patch, and also the Berlayer rock, keep Tereh point, a conspicuous red bluff on Ayer Brani island, well open of the Peninsular and Oriental Company's jetties.

MOUNT FABER is the name of a conspicuous range of hills which rise boldly up on the northern shore, about the middle part of New harbour. The direction of the range is about N.W. and S.E., the highest point, 357 feet, being towards its north-west end. Near the middle of the range is a flagstaff, which, like that upon Fort Canning hill, is crossed by two yards, used for signalling the arrival of ships from the westward, and repeating the signals made from Fort Canning. The height of the range where the flagstaff stands is 303 feet, exactly the same height as Mount Serapong on the opposite side of New harbour.

Eastward of Mount Faber, behind the wharves and jetties, are several small hills from 100 to 132 feet high.

AYER BRANI ISLAND, commonly known as Pulo Brani, lies inside the eastern entrance to New harbour. It is nearly two-thirds of a mile long, N.W. and S.E., and the same extent East and West; its greatest length is on its north-eastern side, facing Singapore roads, and upon this part are three hills, the middle one, which is the highest, being 168 feet above the sea. Teregeh point, the south-east extreme, and Tereh point, the north extreme of the island, are both formed by cliffs; those forming Tereh point are of a red colour and present a bold, red bluff, which is very conspicuous when viewed from either entrance of the harbour.

This island, like Blakan Mati, is encircled by a coral reef with occasional patches of sand upon it, which uncovers at two-thirds ebb. From Teregeh point the reef projects about half a cable's length to the southward, and more than 2 cables' length eastward, the extreme of the latter part being known as Teregeh spit, and marked by a white beacon. From this spit the reef curves round gradually, passing about a cable's length

from Silingsing point, the middle point of the island ; it then closes the island until at Tereh point it is distant only about 20 or 30 yards. From Tereh point it curves slightly in towards Saga bay, and then runs pretty straight about W.S.W., and forms a spit, the outer part of which is more than $1\frac{1}{2}$ cables' length westward of Risim point, the west extreme of the island.

The north-west side of Ayre Brani, between Tereh and Risim points, is the most important part of the island. Between these points is Saga bay, dry at low water, which offers great facilities for the construction of dry docks. Some few years ago a dry dock was commenced by a Mr. Clunis, who had early perceived the advantages possessed by this island for such enterprises. He had made considerable progress with his work when he was stopped by the Government, who took possession of the property, owing to Mr. Clunis having failed to possess himself of a proper legal grant of the land. The Government has since built a temporary jetty and coal stores close to the dock, at the north-eastern part of Saga bay, but with the dock itself nothing has been done. These coal stores and jetty are at present in a dilapidated state, but they are about to be replaced by permanent structures. Just to the north-eastward of Risim point, the French Government has erected some good coal stores and run out a convenient jetty, off which mooring buoys are placed to secure the vessel to.

SINKI STRAIT, the channel between Ayer Brani and Blakan Mati islands, is not at present used. To render it navigable, it would be necessary to place beacons on the edges of the reefs bounding it ; even then it would be hardly safe for sailing vessels, owing to the uncertainty of the direction of the gusts of wind caused by the adjacent high land.

The entrance to this channel from the eastward is between Teregeh and Berala spits, where it is about a cable wide, with depths of 7 to 12 fathoms ; inside Teregeh and Berala points the depths decrease to 7, 6, and $4\frac{1}{2}$ fathoms. A tongue with only $2\frac{3}{4}$ fathoms water upon it projects from the west point of Bindarah bay, on Blakan Mati island, nearly to the opposite side of the strait in the direction of Kopih village ; a little farther to the westward the strait is barred across, the greatest depth on the bar being 3 fathoms. Off the south side of the western part of Ayer Brani is a detached reef, dry at low water, and surrounded by a bank which projects more than half-way across the channel towards Blakan Mati, narrowing it to the breadth of half a cable's length. The western entrance of the strait, between the spit off Risim point and the reef fronting Blakan Mati, is quite clear, with depths of 4 and 5 fathoms.

SILUGU ISLAND lies at the western entrance of Sinki strait, about a third of a mile West from the extreme of the spit projecting from Risim

point, and fronts a shallow bight, dry at low water, named Imbeah bay. It is a remarkable little island, almost circular in shape, and moderately elevated, with a small bungalow on its summit.* The shore reef projects from the coast, a short distance outside this island; close to it are $3\frac{1}{2}$ to 5 fathoms.

On a projecting point of Blakan Mati, a short distance to the south-eastward of Silugu, is a jetty for heaving down ships.

BERDAUN ROCK is a small patch of reef above water, grown over by mangrove trees, distant about $1\frac{1}{2}$ cables westward of Silugu island, and half a cable from the Blakan Mati shore. A reef, dry at low water, extends about two-thirds of a cable westward, and about a third of a cable northward and eastward from it. Close to this reef are $2\frac{3}{4}$ and 3 fathoms water, excepting on its eastern side, where the depths are less, there being but $2\frac{3}{4}$ fathoms at two-thirds of a cable from the mangrove trees on the rock.

Between this rock and the shore there is a channel, about one-third of a cable wide, with depths in it of $3\frac{1}{2}$ to $5\frac{1}{2}$ fathoms.

RINEAU POINT, the north-west extreme of Blakan Mati, and the south-west limit of New harbour, is formed of cliffs with patches of shelving rocks projecting from their bases. The shore reef extends only a short distance from the north and west sides of the point, and close to it are $3\frac{1}{2}$ and 4 fathoms, excepting in a W.N.W. direction from the west extreme of the point, where a sort of narrow tongue with but $1\frac{1}{2}$ fathoms water projects to a distance of half a cable's length.

BRANI SHOALS lie at the eastern entrance of New harbour, between Pagar point and Ayer Branir island. They extend, under a depth of 3 fathoms, about half a mile N.W. by W. and S.E. by E., and from their south-east extreme Teregeh point bears S.W. by W., and Pagar point N. $\frac{1}{4}$ W.; from their north-west extreme the eastern part of Teregeh point bears S. $\frac{3}{4}$ E., and Pagar point N.E. by E. $\frac{1}{2}$ E. The least water upon these shoals is $1\frac{3}{4}$ fathoms, this part being near their centre, and in length it is about 2 cables, and from a few yards to half a cable wide. The channel on their eastern side is marked by three white buoys, one near their south-east extreme, one near their middle, and the other half a cable's length inside their north-west end.

The soundings decrease gradually towards these shoals, and if the lead be properly attended to, it will show when a vessel is nearing them. The

* This bungalow is named Pilot house on the chart of New harbour, owing to its having been built and first inhabited by Mr. Clunis, then the Pilot for the Peninsular and Oriental Company; but it is not the usual residence or station of a pilot, as might be inferred from the name given to it.

channel between them and Blakan Mati is about a cable wide, with depths in it of 3 to 10 fathoms.

TIMBAGA ROCKS and SHOAL.—The Timbaga rocks, dry at low water springs, lie between Pagar point and the shoalest part of the Brani shoals; they are about half a cable long N.W. by W. $\frac{1}{2}$ W. and S.E. by E. $\frac{1}{2}$ E., but only a few yards broad. Two *red* beacons mark these rocks, one on either extreme.

The Timbaga shoal, about half a cable in extent, and with only $1\frac{1}{2}$ fathoms least water over it, lies about a cable's length north-westward of the Timbaga rocks, and its north-western end is marked by a *red* buoy.

Both of these dangers are bold, having depths of 4 and 5 fathoms very close to them.

MEANDER SHOAL, about a cable in extent, east and west, with 6 to 16 feet water over it, lies on the south side of the main channel of New harbour, about $1\frac{1}{2}$ cables south of the Peninsular and Oriental Company's works, and a cable to the north-west of the extreme of the spit extending from Risim point. The shoal is marked by two buoys, one near its south-east and the other near its north-west end; around it, and in the channel between it and Risim spit, the depths are $3\frac{1}{2}$ to $4\frac{1}{2}$ fathoms.

A mooring buoy, for the use of the Peninsular and Oriental Company's steamers, is placed 110 yards to the northward of the eastern extreme of this shoal.

KEPPEL ROCK, with 15 feet water over it, lies W.S.W., a cable's length from the western extreme of the Peninsular and Oriental Company's works. Close around the rock are soundings of 5 and 6 fathoms, and a buoy is placed near its eastern side. The south extreme of Mount St. James on with the eastern extreme of the Peninsular and Oriental Company's jetties leads southward of the rock.

ANCHORAGE.—The general depths in New harbour are 6, 7, or 8 fathoms, but the bottom is foul and rocky and very indifferent holding ground. Staff Commander Richards, R.N., who surveyed this harbour in H.M.S. *Saracen*, which vessel remained at anchor there for 3 months, remarks:—"The holding ground is bad, and great care is necessary to prevent fouling the anchors: vessels remaining more than a day should moor." The best anchorage is considered to be off the French Naval coal stores.

TIDES.—It is high water, full and change, at the Peninsular and Oriental Company's wharf, at 9 h. 45 m. Springs rise 10 feet, neaps $7\frac{1}{2}$ feet. The ordinary rate of the tide at springs is $2\frac{1}{2}$ knots, but it is much influenced by the prevailing monsoon, and often runs 4 knots at the springs. During the N.E. monsoon the stream sets to the westward 18 hours in the 24 during spring tides, and almost continuously during neaps.

The following remarks on the tides of Singapore roads and New harbour are by Captain H. T. Marshall, superintendent of the Peninsular and Oriental Company, 1856 :—The irregularities of the tides are very great, so that no dependence can be placed on them from one day to another ; for although a tide may rise 8 feet one day, it may increase to 12 feet the next, and the contrary. Again, the night tide may be the lowest in one 24 hours,—and in the next the morning tide. During the N.E. monsoon and neap tides, although the water rises and falls, yet the stream continues to run to the westward, sometimes for 2, 3, or 4 days consecutively ; at other times it may be as many days quite still ; or a rush of water will flow into and out of the harbour at the rate of 3 and 4 knots. All these fluctuations occur most frequently during the N.E. monsoon, and depend chiefly on the force of the wind in the China Sea, yet they sometimes do happen in the S.W. monsoon, without any apparent cause.

DIRECTIONS.—Vessels proceeding from Singapore roads into New harbour, should steer *about* S.W., according to their draught, not approaching Malang or Malay point nearer than a mile, nor hauling to the westward until Mount Faber flagstaff is in line with the eastern extreme of the landing jetties, which clears the shoal spit off Malay and Pagar points. In rounding these points the fishing stakes furnish a ready guide to vessels, the outer ends of the longest lines of stakes having 3 fathoms water close to them, increasing at a short distance to 5 and 7 fathoms. Having rounded Malay and Pagar points, steer to the westward until the two *red* beacons on the Timbaga rocks are in line, bearing N.W. by W.— $\frac{1}{4}$ W., and observing that Teregeh point, the south-eastern extreme of Ayer Brani island, must not be brought to the westward of W. $\frac{1}{4}$ S., which clears Berala spit and the northern part of the Buran Darat, and remembering that the north-eastern extreme of the latter is marked by a *white* beacon.*

To proceed through the channel, north-eastward of the Timbaga rocks, steer *about* N.W., and passing about half a cable's length westward of the outer, or south-easternmost of the two *red* beacons which mark Pagar spit, open the Timbaga rock beacons on the port bow and pass in mid-channel between those beacons and the inner or north-western beacon of Pagar spit. Continue on a N.W. by W. course, according to circumstances, leaving the *red* buoy on the Timbaga shoal about half a cable's length on the port hand, and edging to the westward as convenient when Pulo Silugu, a small round island with a bungalow on its summit, is seen just open of the *red* cliffs of Tereh point, which

* Staff Commander Richards observes, that owing to the strong tides and to the hard bottom, the floating beacons frequently break adrift, so that no dependence can be placed upon them ; he therefore recommends strangers to take a pilot.

mark clears the north-west extremes of the Timbaga and the Brani shoals.

It should be remembered when passing between the north-western extremes of the shoals just mentioned and the coral bank which extends $1\frac{1}{2}$ cables' lengths from the shore of Singapore island, and which uncovers at two-thirds ebb, that the edge of the latter is marked by two fixed *white* beacons, one North of the *red* buoy on the Timbaga shoal, and the other about midway between the *white* beacon just mentioned and the extremes of the jetties ; close to these beacons are 3 and 4 fathoms water.

To proceed to the south-westward of the Timbaga rocks, after having rounded Malay and Pagar points, and brought the beacons on the rocks in line, steer about N.W. by W., opening the beacons on the starboard bow, and pass about half a cable's length to the westward of both of them, and also of the *red* buoy on the Timbaga shoal, about midway between the latter and the *white* buoy on the north-east extreme of the Brani shoals, in depths of 7 to $4\frac{1}{4}$ fathoms, deepening to 6 and 7 fathoms as Pulo Silagu comes open of the *red* cliffs of Tereh point ; when steer West and W.S.W. to pass mid-channel between the jetties and Tereh point, leaving the *red* beacon and mooring buoys on the starboard hand.

The best anchorage is abreast of the French Naval coal stores, but if wishing to proceed farther to the westward or through the harbour to the westward, a vessel may pass on either side of the eastern of the two mooring buoys off the Peninsular and Oriental Company's wharf, but it is better to pass it on the south side, pretty close to, giving a good berth to the buoys on the Mæander shoal, which will then be on the port side. Keppel rock will be avoided if the south extreme of St. James mount is not shut in behind the east extreme of the P. and O. Company's jetties.

Having passed between the Mæander shoal and Keppel rock, a vessel may anchor where convenient, as nearly in mid-channel as possible. To proceed from thence through New harbour to the westward, it will be merely necessary to steer about W. by S., and taking care not to get too close over towards the Berdaun rock, keeping as nearly in mid-channel as possible, and so pass out of the harbour. The conspicuous *red* bluff forming Tereh point if kept well open of the P. and O. Company's works, will lead out clear of the reef extending from the south end of Hantu, on which there is a *red* beacon, and also of the Berlayer rock and 19-foot patch just outside the harbour.

SINKI CHANNEL, or Salat Sinki, by which New harbour is approached from the westward, is bounded on either side by reefs, the edges of which are marked by beacons.* Its length is 4 miles, and its breadth, at the eastern part, where it is narrowest, is but three-quarters

* See Chart of Singapore Strait, Sheet 2.

of a mile. The depths in it are very irregular, generally from 9 to 15 fathoms, but in places there are over 20 fathoms. The eastern extreme of the channel is about 3 miles to the westward of New harbour, and the western extreme, about the same distance from the Sultan shoal, described at page 292.

North side.—The first of the reefs, westward from New harbour, are named the Cyrene shoals, and their south-east extreme bears from Lots Wife W. by S., distant $2\frac{3}{4}$ miles. They consist of two patches, which dry at three-quarters ebb, extending nearly $1\frac{1}{2}$ miles east and west, and about half a mile north and south. The eastern patch is twice as large as the western one, from which it is separated by a narrow channel. A *beacon* is placed upon the south extreme of each of the patches.

The next patch lies 3 miles to the westward of the western beacon of the Cyrene shoals; it is very small, and has a *beacon* on its north side.

Half a mile North of this patch is a small island named Pulo Laut, having a smaller island close to the eastward of it. These two islands are the southernmost of an extensive group of islands lying close together, and to the northward of which, between them and the Singapore shore, is a navigable channel named Salat Sambulan.

The outermost reef on the north side of the Sinki channel, and which may be considered to form its north-western limit, is a small patch lying W. $\frac{3}{4}$ N. $1\frac{1}{2}$ miles from the beacon on the small patch last mentioned; W.S.W. 1 mile from the west end of Pulo Laut; and N.E. by E. $\frac{1}{2}$ E. $2\frac{1}{2}$ miles from the Sultan shoal: this patch is not marked by a beacon.

South side.—The south side of the channel is marked by four *beacons*, the whole of them being nearly in line on a W. by S. and E. by N. bearing, and almost equidistant from each other. The easternmost beacon, bearing S. by E. $\frac{3}{4}$ E. about three-quarters of a mile from the eastern beacon on the Cyrene shoals, is placed on the northern edge of the reef which surrounds Freshwater island, or Pulo Bookum, and Pulo Oelar. The next beacon, about a mile distant, is on the edge of the reef which extends from Pulo Bosing. Westward of this last are two reefs, which dry at three-quarters ebb, and their northern edges are each marked by a beacon.

Pulo Salook, a small islet, 90 feet high, may be considered as the south-western limit of the Sinki channel. It is surrounded by a reef which projects nearly a quarter of a mile from it, and other patches of reef lie in a S.S.W. direction, and extend more than half a mile from it. Pulo Salook bears S. $\frac{3}{4}$ E. nearly $2\frac{1}{2}$ miles from the beacon on the reef south of Pulo Laut, S.E. by E. $2\frac{3}{4}$ miles from the reef which forms the north-western

limit of the strait, and E. by S. $\frac{3}{4}$ S. $3\frac{3}{4}$ miles from the tripod beacon on the Sultan shoal.

DIRECTIONS.—Coming from the westward and intending to proceed through the Sinki channel, a course may be steered to sight the tripod beacon on the Sultan shoal, which may be passed at a prudent distance on either side. But to provide against the chance of the beacon having disappeared, or in the event of thick weather, the safer plan will be to steer for Pulo Salook—which being a small round islet 90 feet high, can be readily distinguished—on an East or E. $\frac{1}{2}$ S. bearing. When the tripod beacon is made out,* and is brought to bear from N.N.W. to N.W., steer from E. by N. to E.N.E., giving Pulo Salook a berth of $1\frac{1}{2}$ miles; after it is passed keep a good look-out for the outer beacons on either side of the channel, when it will be only necessary to steer mid-channel between them.

The same course, E. by N.—always remembering to guard against the effects of tide—will lead to the entrance of New harbour, which should also be entered in mid-channel, taking care not to get too close over towards Berlayer point, and to keep the conspicuous red bluff, which will be seen on the south side of the harbour, well open of the P. and O. Company's jetties, to clear the Berlayer rock. It is very necessary, however, when taking care to avoid this rock, not to get too close over on the opposite side, as has sometimes happened; the best plan is to keep as nearly as possible in mid-channel.

Horsburgh gives the following directions for vessels bound from the eastward to the western entrance of the New harbour:—Pass southward of St. Johns, Soobur, or Sisters isles, giving them a berth of half a mile to avoid a shoal patch of 18 feet, leaving Middle island to the westward about $1\frac{1}{2}$ miles. Rather less than a mile off the south-east part of Middle island is a detached reef (page 291), with an 8 to 12 fathoms channel between it and the island. Pulo Jong, 75 feet high, open of the east end of Middle island N.W. $\frac{1}{2}$ W., just clears it; then steer about N.W. by N. 3 miles in from 9 to 13 fathoms, guarding against Terumbo Sileege shoal lying N.W. $\frac{3}{4}$ N. distant 1 mile from Soobur island, the only danger on the eastern side of the passage. The islands bounding the western side of the channel may be approached to half a mile, or less if necessary. In the fair channel the general depths vary from 10 to 17 fathoms.

The Tides are very irregular in the passages among the islands, running sometimes 4 miles per hour at springs.

* If the tripod beacon upon the Sultan shoal cannot be seen, a vessel should not proceed until she is quite certain of her position, and assured that some accident must have happened to the beacon. As the mail steamers, both to and from Europe, now pass through the Sinki channel, great attention is paid to the beacons which mark it.

SINGAPORE STRAIT ; WESTERN PART.

ST. JOHN'S ISLANDS, which limit Singapore roads to the south-westward, and form the eastern limit of the north side of this part of Singapore strait, have been already described at page 276.*

The **SISTERS** are two small islets not quite a mile to the westward of West St. Johns island ; the South Sister, named Pulo Soobur, is 89 feet high. They are surrounded by reefs, which in places extend to the distance of a cable's length, and close to their edges are irregular soundings of 5 to 9 fathoms. South from the South Sister, the soundings soon deepen to 10, 12, 16, and 18 or 19 fathoms. The channel between them and West St. Johns is free from danger, with depths of 14 to 24 fathoms ; but about one-third of a mile West-southerly from the South Sister, is a patch, with 18 feet water over it.

MIDDLE ISLAND, or Pulo Sabaroot, 78 feet high, bears W. by S. $3\frac{1}{2}$ miles from West St. Johns, and N.E.-easterly $4\frac{1}{2}$ miles from Raffles lighthouse. It is a green island, with other islands to the north-westward of it. It is surrounded by a reef, which from its south-east point projects nearly a third of a mile.

A **DANGEROUS REEF** of rocks lies S.E. by E. three-quarters of a mile from the south-east point of Middle island. The reef is small, and always covered, except at very low tides, some points of the rocks being then just discernible. From it, the south extreme of West St. Johns island bears E.N.E. 3 miles, Raffles lighthouse S.W. by W. $\frac{1}{4}$ W. $4\frac{1}{2}$ miles, and Buffalo rock S. by E. $\frac{1}{4}$ E. The chart shows no soundings on the south side of this reef, but there is said to be deep water close to ; on the north side it is said to be "a steep coral wall,"† and the chart shows 8 fathoms close to this side.

Pulo Jong—a small round islet 75 feet high, lying half a mile north-west of Middle island—open eastward of Middle island leads north-east of the reef, and the south point of West St. Johns N.E. by E. $\frac{1}{2}$ E., or Raffles lighthouse S.W. by W. $\frac{1}{2}$ W., leads to the southward.

The North side of the channel between Barn island and Middle island is bounded mostly by shoals and coral reefs, partly dry at low water. S.W. by W. nearly $2\frac{1}{4}$ miles from Middle island, is a reef, the middle part of which is dry.

The **RABBIT** and **CONEY** are two small islets, nearly connected with the south-east end of Barn island by a reef of rocks partly dry at

* See Charts :—Singapore Roads, No. 1,995, scale, $m = 6$ inches ; and Strait of Singapore, sheet II., No. 2,403, scale, $m = 0.65$ of an inch.

† Horsburgh.

low water. The Coney, or southermost, is the smallest, and distant from the point of Barn island rather less than one-third of a mile. The Rabbit is on with the centre of Barn island bearing N.W. $\frac{3}{4}$ W., the Coney is on with it, N.W. $\frac{3}{4}$ N., nearly, and these islets are in one with each other, bearing N. by E. $\frac{1}{2}$ E. A rocky spit, covered at high tide, projects nearly a cable's length to the southward from the Coney ; consequently the islet should be given a berth of 2 cables.

LIGHT.—Raffles lighthouse on Coney island, was named after Sir Stamford Raffles, the founder of Singapore. It is in lat. $1^{\circ} 8\frac{1}{4}'$ N., long. $103^{\circ} 44' 38''$ E., and exhibits at an elevation of 105 feet above high water, a *fixed* white light which is visible from a ship's deck at the distance of 12 miles. It bears S.W. by W. $\frac{1}{2}$ W. $7\frac{1}{2}$ miles from the south end of West St. Johns island ; E. $\frac{1}{3}$ N. nearly $5\frac{1}{2}$ miles from the north end of Tree island reef ; S.E. $\frac{1}{4}$ E. nearly $7\frac{1}{2}$ miles from the Sultan shoal ; N.W., westerly, 3 miles from Helen Mars reef ; and West, southerly, $4\frac{1}{2}$ miles from Buffalo rock.

BARN ISLAND, or Pulo Sennang, about a mile in extent and 133 feet high, lies close to the north-west of the Rabbit and Coney, and E. by N. $\frac{1}{2}$ N. 5 miles from Tree island. It is of a square level aspect, covered with trees, and visible at the distance of 15 miles. Its south and west sides are fronted by a reef extending 2 or 3 cables from it, close to which are 9 or 11 fathoms with 18 and 19 fathoms a short distance off.

ALLIGATOR ISLAND, or Pulo Runcan, nearly joins the north-west end of Barn island, the space between affording no passage for ships. It is about the same size, but 52 feet higher than Barn island, and of a sloping form, the highest part being at its south end. At a quarter of a mile from its south end are 14 and 16 fathoms, but off its west side not more than 6 to 9 fathoms will be obtained at half to two-thirds of a mile.

OTHER ISLANDS and DANGERS.—A mile to the northward of Alligator island is a small island, Pulo Soodong, inside which, between Middle and Freshwater islands, are several islands with numerous coral reefs amongst them, the exact positions of which are unknown ; these islands and dangers lie quite out of the track of shipping. Pulo Salook has been described at page 289.

SULTAN SHOAL, which forms the north-western limit of the western entrance to Singapore strait (page 289), is of circular form, about two-thirds of a cable's length in diameter, and the rocks on its shoalest part are about 2 feet above the sea at low water spring tides. Its north side is marked by a tripod *beacon*, from which the north-west extreme of Tree island reef bears S. $\frac{1}{4}$ E. 5 miles ; Pulo Salook E. by S. $\frac{3}{4}$ S. $3\frac{1}{4}$ miles ; and Raffles lighthouse just open of the west extremes of Alligator

and Barn islands, S.E. $\frac{1}{2}$ E. $7\frac{1}{2}$ miles. Captain Ross examined this shoal in 1829, and reported it to be steep-to, 7 fathoms water within a boat's length of the rocks.

SOUTH SIDE OF THE STRAIT.

The strait, between the Rocky ledges north-westward of Little Sambo and St. Johns islands (described in pages 247 and 276), is $2\frac{1}{2}$ miles wide, with very irregular soundings varying from 15 or 16 to 40 or 50 fathoms.

CAUTION.—EDDIES and OVERFALLS.—Owing to the strong tides which rush through this part of the strait, and the rocky and uneven nature of the bottom, violent eddies and overfalls, very alarming to strangers, are usually to be met with, more especially on the south side of the channel, towards the Sambo islands; for which reason, as also because of the dangers and great depths of water on that side, it is advisable to keep on the north side, near St. Johns islands,—a custom always followed by those accustomed to the navigation of the strait.

THE COAST.—That part of the southern side of Singapore strait between the Sambo islands and the north-western extreme of Boelang island, a distance of $7\frac{1}{2}$ miles to the S.W. by W., is formed of numerous islands lying on either side of the entrance of Batu Hadji strait, which separates the large islands of Battam and Boelang.

PULO SENNANG, the outermost of the islands at the eastern side of entrance to Batu Hadji strait, is only about a third of a mile in extent, and bears S.W. by W. $\frac{1}{2}$ W. about $1\frac{1}{2}$ miles from the north-west extreme of Little Sambo, and S. by E. $\frac{1}{4}$ E. 3 miles from West St. Johns. Westward of this island there are many dangers.

BARREN ISLAND, the outer of the small islands on western side of entrance to Batu Hadji strait, it is a mere rock or islet, and bears S.W. by W. $\frac{1}{2}$ W. $2\frac{1}{2}$ miles from Pulo Sennang; S. by W. $\frac{1}{4}$ W. $4\frac{1}{4}$ miles from West St. Johns; and S.E. by E. $\frac{1}{4}$ E. $1\frac{1}{4}$ miles from Buffalo rock.

No soundings appear on the chart near Pulo Sennang. Barren island appears to be free from danger, with depths of 13 to 18 fathoms between it and Buffalo rock; but, as previously remarked, vessels should avoid getting on this side of the strait.

BUFFALO ROCK, lying well out towards the fairway of the strait, is of a black colour, about the size of a long-boat, always above water, with 30 and 40 fathoms water near it to the southward, and irregular soundings of 13, 18, and 25 fathoms close to it on the north-west side. It bears S.W. by S. 4 miles from the south extreme of West St. Johns; S.S.E. 3 miles from Middle island, and East-northerly from Raffles light-

house. The ship *Soliman Shah*, having got over on the south side of the strait during light winds, was drifted by the tide close to this rock, and let go her anchor in 60 fathoms, from which she slipped when a breeze sprung up, to keep clear of the danger.

Between the Buffalo rock and the reef off the south-east end of Middle island, the strait is $2\frac{1}{2}$ miles, the same breadth as between the Rocky ledges and West St. Johns. It is prudent, in working here, to keep nearest the north side of the channel, making short tacks, and not to deepen above 30 or 34 fathoms towards the Buffalo rock, and the south side of the strait.

PHILLIPS CHANNEL, with Helen Mars and adjacent reefs and islands, Long Island, Red island, Kent rocks, and Tree islands, with their surrounding reef, have already been described in page 231.

SOUNDINGS.—Close to the southward of the St. Johns islands the soundings are very irregular, 20 to 30 fathoms. A bank, upon which the general depths are 13 to 19 fathoms, lies in front of the Sisters, extending from them to a distance of more than a mile, in a southerly and south-easterly direction; and another bank, composed of rotten rock and sand, and having similar depths over it, lies in front of Middle island, outside the dangerous rock which lies S.E. by E. three-quarters of a mile from that island. This bank extends between the bearings of South and E.S.E. from Middle island; and from its western extreme to the Raffles lighthouse the soundings on the north side of the channel are deep, 25 to 30 or 34 fathoms, but decrease to 20 and 18 fathoms when within the distance of three-quarters of a mile from the reefs which bound that part of the channel.

In mid-channel, between the St. Johns islands on the north side and Pulo Sambo and Pulo Sennang on the south side, the soundings are deep 40 to 50 fathoms, between Middle island and Buffalo rock 25 to 45 fathoms, and from thence to between Raffles lighthouse and Helen Mars reef 30 to 40 fathoms; with a few soundings of 16 to 21 fathoms on the edge of the bank which extends to the westward of Buffalo rock.

The chart exhibits but very few soundings on the south side of the channel near the Rocky ledges and from thence to the westward as far as Pulo Sennang, and those few indicate very irregular depths, rocky patches of 11 and 12, near 25 and 30 fathoms, on which account, as also on account of the eddies and overfalls which are common here, this part of the strait ought to be avoided. Northward of Barren island and eastward of the Buffalo rock, the chart shows tolerably regular soundings of 12 to 16 fathoms, for a distance of $1\frac{1}{2}$ or 2 miles in those directions, but near the Buffalo rock no soundings appear. Between the Buffalo rock and Barren island, and between the rock and Helen Mars reef, are irregular soundings of 12 to 18 fathoms; and similar depths are shown as extending from Buffalo rock $2\frac{1}{2}$ miles in a westerly direction, towards

Raffles lighthouse, and for about a mile north-westward and westward from Helen Mars reef: outside the limits just named the depths suddenly increase to 30 or 35 fathoms.

The soundings southward of the Coney are deep but irregular. Pretty close to the reef which projects from it are 28 fathoms; at the distance of half to three-quarters of a mile are 20 and 18 fathoms, quickly deepening to 30 and 37 fathoms; south-westward from the Coney soundings of 18 or 19 fathoms extend to the distance of about $1\frac{1}{2}$ miles, and then deepen to 40 or 50 fathoms towards Long island. A patch of 10 fathoms lies about a mile W.S.W. from Coney island, and a little over $1\frac{1}{2}$ miles to the westward of the lighthouse, is the south-eastern extreme of a bank, with 6 to 9 fathoms on it, which extends from thence in a north-westerly direction more than 3 miles, its breadth being a mile at its south-eastern, and half a mile at its opposite end. Between the 10-fathoms patch and Barn island are depths of 19 fathoms, and the same depths between the south-east extreme of the large bank and the same island, those depths being found very close to the reef which extends from the island. Close to the south side of the reef which surrounds Alligator island are 14 fathoms, but a bank with 7, 8, and 9 fathoms over it, extends about three-quarters of a mile from the west side of that island, between which and the off-lying bank are soundings of 13 to 18 fathoms. A patch having 11 fathoms water over it and 13 to 16 fathoms around it, lies about three-quarters of a mile to the westward, and another similar patch of 11 fathoms lies about the same distance to the northward of the north-western extreme of the off-lying bank: the soundings over the remaining space lying between the bank, Pulo Salook, and the Sultan shoals, appear to be very irregular, 13 to 23 fathoms; near the Sultan shoal the decrease is sudden, 12 to 8 fathoms.

Close to the reefs which surround the islets bounding the south side of this part of the strait are 8 to 12 fathoms, with depths under 20 fathoms from half to three-quarters of a mile from them, but outside the distance of a mile the depths increase to 40 and 55 fathoms near Long and Red islands, and from 20 to 34 fathoms throughout the remainder of the strait.

A mile or two to the westward of a line between the Sultan shoal and Tree island, the depths are very variable, 12 to 19 and 20 fathoms, whilst from 2 to 4 miles to the westward of that line, in the fairway leading to and from the channel, is a space (where the tides meet), with 25 fathoms water; from thence to Tanjong Bolus and the Little Carimon, the soundings appear to be rather more regular, 16 to 20 fathoms towards the former, and the same towards the latter until within 4 or 5 miles of it, when they deepen to 20, 24, and 26 or 28 fathoms.

TIDES.—The flood from the Straits of Malacca sets to the eastward, and

the flood from the China Sea sets to the westward, meeting between Tanjong Bolus and Tree island. It is high water at Rabbit island at full and change at 11 a.m., but the tide does not set to the eastward till about 1 p.m., and it is then about half low water by the shore.

The tides set fairly through the channel about E.N.E. and W.S.W. between St. Johns islands and Raffles lighthouse, frequently very strong, with eddies on the springs. Their velocity, when strongest, is from 4 to $4\frac{1}{2}$ miles per hour, making it unpleasant to anchor here in large ships when the weather is unsettled in the night, particularly if unacquainted. From Raffles lighthouse to the western entrance of the strait the tides cannot be depended on to set as fairly through the channel as they do to the eastward of the lighthouse, but may be expected to draw more across the channel in a north-easterly and opposite direction. Outside the strait between Tree island and Tanjong Bolus no dependence can be placed upon the set of the tides, for they sometimes run strong down towards the straits of Durian, and at other times to the northward towards the Old strait of Singapore.

The flood has been observed in both monsoons to run to the westward 10 or 12 hours at a time, or even 18 hours, strong and weak, alternately; at other times, the flood sets only 6 hours to the westward, and the ebb the same length of time to the eastward; but the tides throughout Singapore strait are seldom very regular.

During the strength of the N.E. monsoon at neap tides, the current sets to the westward at times for three or four days, although there is a regular rise and fall by the shore.

Horsburgh states the perpendicular rise and fall of tide in the strait to be 12 to 14 feet at springs, but it is probably not so much as that, for Staff Commander Richards, R.N., commanding H.M.S. *Saracen*, found the rise and fall in New harbour to be 10 feet at springs and $7\frac{1}{2}$ feet at neaps.

TEMPORARY ANCHORAGES.—Owing to the strong tides and currents in the western part of Singapore strait, sailing vessels are frequently obliged to anchor, for which purpose the north side of the channel is much to be preferred. The most convenient spots for the purpose between St. Johns and Raffles lighthouse, are the banks which front the Sisters and Middle islands; see page 294.

Abreast of the south end of St. Johns, a ship ought not to anchor if it can be avoided, for the water is deep, and the tides run in eddies with greater strength than in any other part of the strait.

There appears to be fair anchorage, in 12 to 19 fathoms, a mile or two on either side of Buffalo rock, or between it and Barren island; also between it and Helen Mars reef, as well as about a mile or so to the

northward and westward of the latter danger ; but this side of the strait is usually avoided as much as possible even by those locally acquainted.

To the westward of Raffles lighthouse there is convenient anchorage in 6 to 12 fathoms all along the north side of the strait, while to the southward the water is deep, and the bottom rocky ; the south side of this part of the strait is, therefore, very unsuitable for anchoring purposes, especially when it is remembered that violent squalls are common hereabouts.

CAUTION.—Vessels at anchor, or coming to an anchor during the night, should be careful to ascertain their exact position as nearly as possible, and to have a *good bearing of Raffles light* ; they should also keep a vigilant look-out that they do not drag their anchors, and drift into danger.

Horsburgh gives the following directions :—"If when at anchor during the night, the weather becomes squally, making a ship sheer about with a strong tide, and part her cable, do not let go another anchor, except it be dark,* but run as the wind permits, either round the Coney, and anchor to the westward of Barn island, out of the tide, or round the south point of St. Johns, and anchor to the north-eastward of it, as convenient, in Singapore roads."

DIRECTIONS.—To proceed from Singapore Roads or from the eastward, through the western part of Singapore strait, steer to pass the south point of St. Johns islands as close as the wind may permit, and then about S.W. by W. $\frac{1}{2}$ W. to round the Rabbit and Coney. It is best to keep nearest the north side of the channel in this track, to avoid the Buffalo rock, and the deep water and rocky bottom towards the south shore ; but remember the reef off the south-east end of Middle island. The south end of St. Johns kept N.E. by E. $\frac{1}{2}$ E., or Raffles lighthouse S.W. by W. $\frac{1}{2}$ W., leads clear of this reef, and either of these are safe bearings to lead along the north side of the channel until Raffles lighthouse is approached, which may be rounded at the distance of 2 or 3 cables' lengths, if the wind is northerly.

After rounding the lighthouse, steer ~~N. by E.~~ to pass between Tree island and Sultan shoal ; the lighthouse kept between E. by S. and E.S.E. will lead in a good fairway course, but it must not be brought at all to the northward of East to avoid Tree island, or to the southward of S.E. by E. to clear the Sultan shoal ; having passed between those dangers, a course West or W. by N.—according to the set of the tide and other circumstances—will lead between Little Carimon and Tanjong Bolus.

Caution.—In hazy weather during the night great care must be taken in steering between Raffles lighthouse and Tanjong Bolus, for no de-

* Raffles light now obviates difficulty from this cause.

pendance can be placed upon the set of the tides, for they sometimes run strong towards the Strait of Durian, at other times to the northward, towards the Old strait of Singapore.

To proceed from Little Carimon to the eastward through the western part of Singapore strait—When in mid-channel between Tanjong Bolus and Little Carimon, in 17 to 20 fathoms water, steer East or E.S.E. as the prevailing wind and tide require, observing to bring the north point of Little Carimon W. $\frac{1}{2}$ S., or draw gradually the north peak of Great Carimon in one with the south point of Little Carimon, bearing about W. by S. $\frac{1}{2}$ S., which will lead about 2 miles northward of Tree island. If the wind is southerly, borrow towards Tree island to 14 fathoms, about a mile distant, but no nearer, which will favour the vessel in rounding the Rabbit and Coney.

As before stated, Raffles lighthouse bearing between E. by S. and E.S.E. is the fair channel course between Tree island and Sultan shoal, not bringing the lighthouse to the northward of East to avoid Tree island, nor to the southward of S.E. by E. to clear the Sultan shoal. Having passed Tree island, steer to round the lighthouse at from 2 cables' lengths to 1 or $1\frac{1}{2}$ miles distant; or if the wind and tides are adverse, or from other circumstances it be desirable to do so, anchor to the eastward of Barn island, out of the strength of the tide. Having rounded the lighthouse, steer to pass St. Johns islands at a convenient distance—from 2 cables' lengths to a mile,—not bringing the lighthouse to the southward of S.W. by W. $\frac{1}{2}$ W., or the south point of St. Johns to the eastward of N.E. by E. $\frac{1}{2}$ E., to avoid the danger on the north side of the channel. After rounding St. Johns, and bound to Singapore roads, proceed as directed at page 279; and if bound through the eastern part of the strait, as at page 271.

In Working through between St. Johns islands and Raffles lighthouse, it is usual to keep on the north side of the channel, making short tacks if necessary, as that part of the strait affords tolerably convenient anchorage along the greater portion of it, and vessels are extremely liable to meet with light baffling airs which would render it necessary for them to anchor. It is especially requisite to attend to this when to the eastward of Buffalo rock, for on that part of the south side of the strait the water is deep, and the bottom rocky * and unsafe for

* Horsburgh observes : " It has been said that an American ship passed between the south side of the strait and Buffalo rock, and inside the ledges to the south-eastward of St. John, without discovering any other danger; but there is reason to think, that the bottom is generally rocky on that side, and the tides very irregular, occasioned by the various inlets among the islands which form it. The passage along the south side of the strait ought not to be attempted; even were it surveyed, the northern channel, being wider, would still be found preferable."

anchoring upon, the danger being much increased by rapid currents and tides, with violent eddies and overfalls.

All danger on the north side of this part of the channel will be avoided if the south extreme of St. Johns islands be not brought eastward of N.E. by E. $\frac{1}{2}$ E., or Raffles lighthouse southward of S.W. by W. $\frac{1}{2}$ W., but these bearings more particularly apply to the rock which lies S.E. by E. from Middle island. Vessels may, with proper precaution, stand farther over between the Sisters and Middle island, and bring the south end of St. Johns as far as E. by N. Take care, however, when nearing Middle island not to bring Pulo Jong on with the east extreme of Middle island until the lighthouse bears S.W. by W. $\frac{1}{2}$ W., or the south end of St. Johns N.E. by E. $\frac{1}{2}$ E. When to the westward of the rock, which may be known by seeing Pulo Jong open of the west side of the island, a vessel may stand to the northward until the south end of St. Johns bears E.N.E., but nothing to the eastward of that bearing.

The narrowest part of the channel is when Buffalo rock bears S. by E. to South, between it and the rock lying south-eastward of Middle island; and to know in the night when the vessel is in this part of the channel, Middle island will in general be perceived nearer, and more distinctly than the other islands on the north side the channel. When approaching the meridian of Buffalo rock, or when Middle island bears about N.N.W., be careful to keep Raffles lighthouse to the southward of W. $\frac{3}{4}$ S.—on no account must it be brought to the westward of W. $\frac{1}{2}$ S. when Middle island bears N.N.W. When Middle island bears N. by W., the vessel will be westward of Buffalo rock and in daylight may stand farther to the southward, if necessary, but it is much safer and better to keep over towards the Coney. If, however, a board should be made to the southward, take care to keep clear of Helen Mars reef, page 232.

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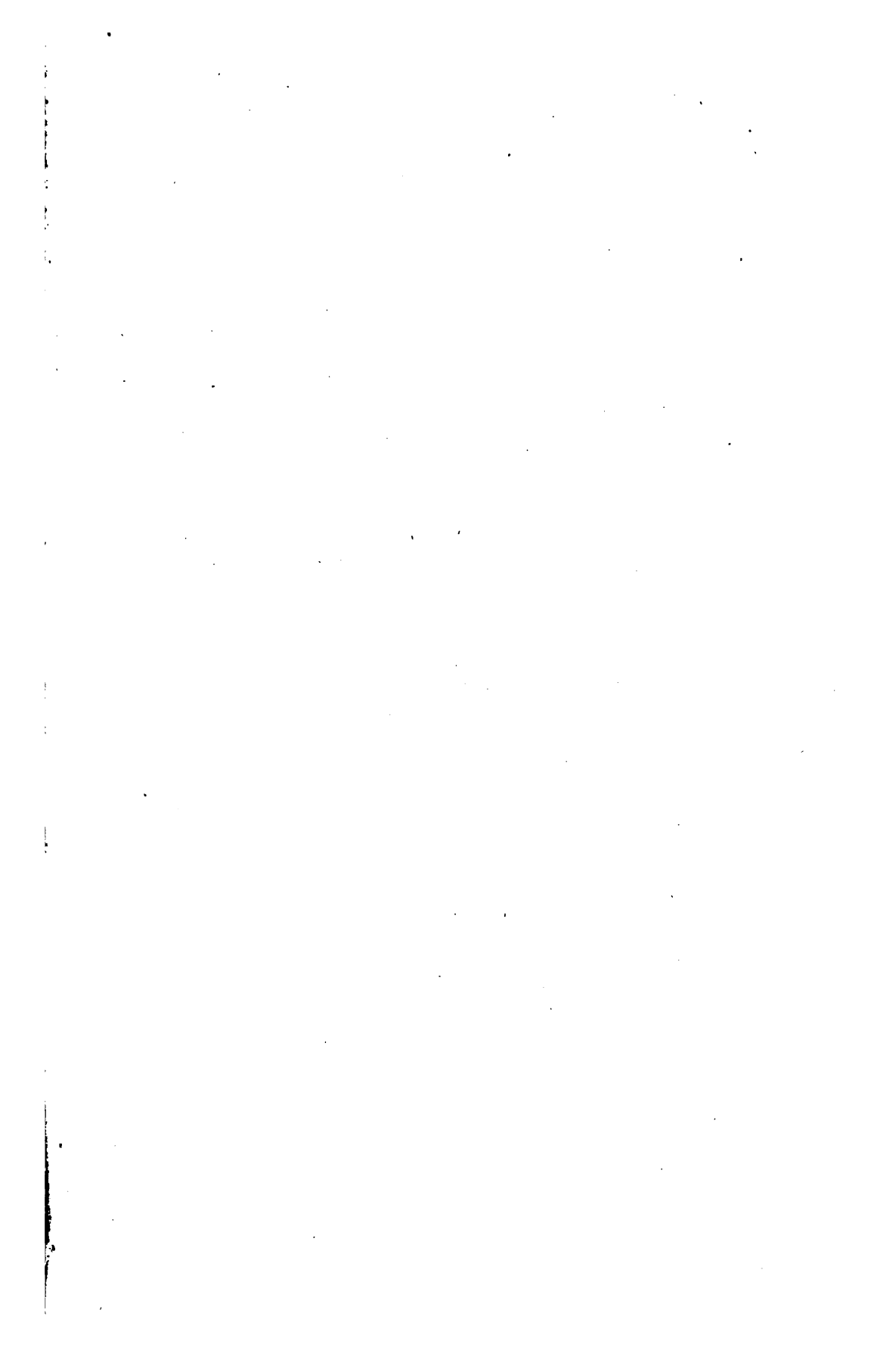
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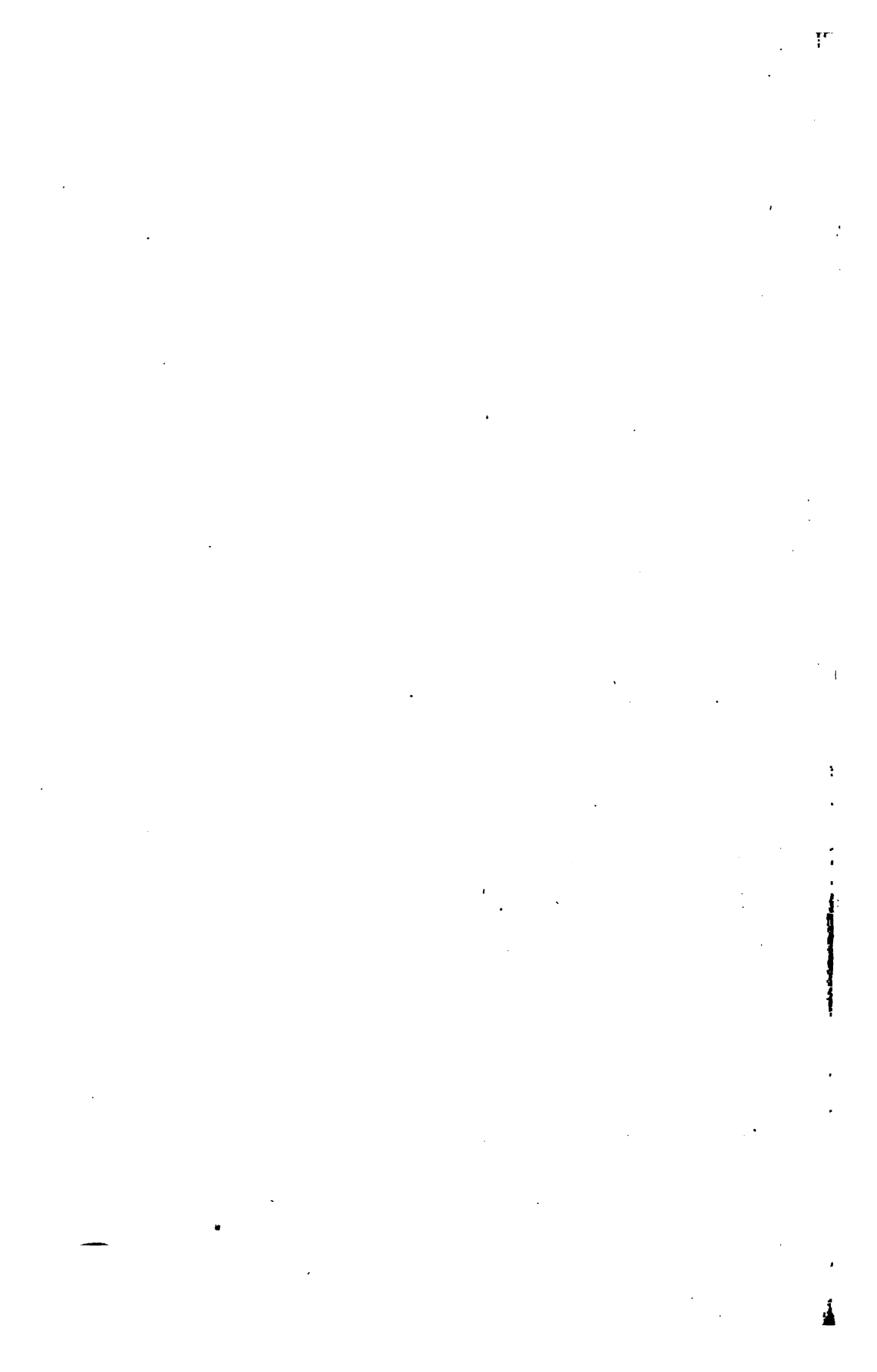
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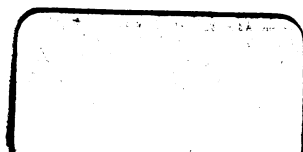


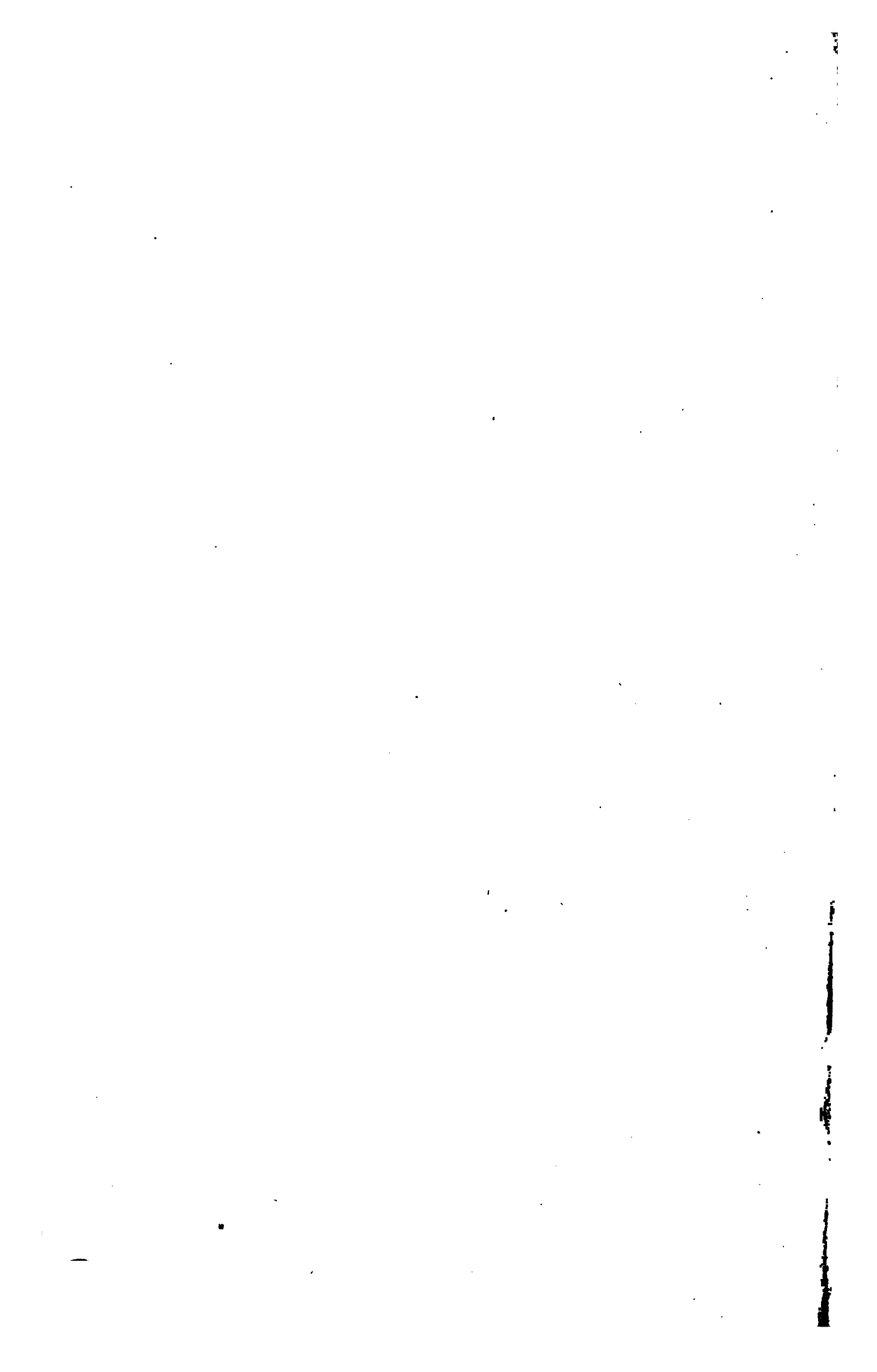


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